TECHNOLOGY DEPT:

NATIONAL PETROLEUM NEWS

Volume 35 | April 7, 1943 | Number 14

PUBLIC LIBRARY
APR 9 - 1943
DETROIT

Oil marketers met last week with Dr. John W. Frey of PAW, center foreground, to talk about wider margins and to draft a questionnaire to prove wider margins are necessary. Left to right around the conference table are: Paul R. Kempf, Ann Arbor, Mich., Staebler-Kempf Oil Co.; John Downing, PAW; R. H. Collacott, OPA; Leslie Neal, San Antonio, Jack Neal Oil Co.; Robert L. Clark, Dallas, Safety Service Stations; Fred W. Werlihy, Orangeburg, S. C., Power Oil Co.; John Harper, Long Island City, N. Y., Harper Oil Co.; F. L. Bond, Jacksonville, Fla., Southern Oil Stores, Inc.; Ralph Brandon, Shreveport, La., Brandon Oil Co.; A. W. Roth, Greensburg, Ind., E. & R. Independent Oil Co.; H. L. Thatcher, Chattanooga, Tenn., Thatcher Oil Co.; W. L. Tyndall, Mt. Joy, Pa., Schock Independent Oil Co.; Clyde E. Wallingford, Columbus, Ohio, Ohio Petroleum Marketers Assn.; E. F. Battson, New York, Continental; John D. Gill, Philadelphia, Atlantic; Katherine Hunsaker, Dr. Frey's secretary; C. W. Grenz, OPA; D. J. Shannan, OPA; Fred E. Bergfors, Quincy, Mass., Quincy Oil Co. (See story p. 6)

WASHINGTON: The matter of a crude price increase still hung in midair, but indications were PAW would soon recommend a boost —possibly 50c per bbl. instead of the 25c urged by PIWC (**P. 3**). Conversion from oil to coal propaganda may be strangled; that was the indication in Washington. Conservation of all fuels propaganda may take place (**P. 3**). PIWC got into the manpower question up to the elbows, debating deferments for marketing employes, now held by WMC to be unessential (**P. 3**). The margin increase bandwagon rolled along as the jobber questionnaire was completed (**P. 6**). Brighter transportation picture fired enthusiasm for eased restrictions on oil consumption. But Ickes was pessimistic, modified a statement of one of his aides that led to speculation that there would be no need for fuel oil rationing in the East next winter (**P. 6**).

TRANSPORTATION: Both sides of Capitol Hill heard proposals for investigations into highway transportation limitations. The truck stockpile dwindled meanwhile and WPB pondered allowing manufacturers to turn out more new units (**P. 30**). Following action by the House appropriations committee deleting $44,000,000 from the War Department civil function supply bill for construction of a trans-Florida barge canal came the announcement by ODT that a $1,000,000 program for constructing and enlarging tank car unloading facilities along the eastern seaboard is being pushed (**P. 30**). OPA, in a 124-page order, put ceilings on used trucks—a long expected move (**P. 32**). WPB stamped its okay on a 20-in. products line from Texas to the eastern seaboard; the line was dubbed the "big little inch" and predictions of completion by December, this year, were heard. The next day, PAW announced the Richmond leg—a new extension—of the Plantation pipeline had started operation (**P. 32**).

News Section . . . p. 3, Chicago Oil Roundup . . . p. 4, Washington News . . . p. 7, War Oil Orders . . . p. 9, Editor's Page . . . p. 13, Refining News . . . p. 15, Production News . . . p. 19, Transportation News . . . p. 30, Serving the Farmer in War . . . p. 34, Equipment Personals . . . p. 38, Coming Meetings . . . p. 39, Statistics . . . p. 40, Markets . . . p. 41, About Oil People . . . p. 50.

PRODUCTION: Reaction in California was mixed following the lifting of ceilings on heavy crudes. Mainly the increase was welcomed but some saw complications arising from the controlled economy of forcing higher prices for a lower quality product while price for higher quality products remained unchanged (**P. 11 and 19**). Reissued as PAO 11 was Conservation Order M-68, minus the rumored "selective drilling" restrictions. But field-wide orders are possible; some were issued simultaneously with PAO 11 as supplemental orders (**P. 20**).

OIL COMPACT: Meeting in Wichita, Kans., Interstate Oil Compact Commission called for higher prices and relief from manpower and materials restrictions which are hamstringing producers. Texas' Col. E. O. Thompson told the meeting we'd be "caught short" of oil if prices don't go up. Warwick Downing, representing Colorado's Gov. Vivian, criticized PAW for not taking a definite stand on the price problem. Importance of price in determining ultimate recovery was recognized by PAW's W. B. Heroy, but the question is "not in my hands" he said. (**P. 24, 26, 28**).

REFINERY MANAGEMENT AND PETROLEUM CHEMICAL TECHNOLOGY EDITION—In 2 Sections, Section 1

R v.35² Ap-De 1943

Flying High

OVER OUR PLANTS

The Army-Navy "E" Symbol of the true American Spirit, the determination to Win!

•

OIL IS AMMUNITION • **BRASS and STEEL are SCARCE**

Use it Wisely *Use them Sparingly*

PRODUCTION IS VITAL

We'll Keep it Rolling

MONEY IS NEEDED • **BUY MORE WAR BONDS AND STAMPS**

MORRISON BROS. COMPANY

OIL EQUIPMENT HEADQUARTERS

DUBUQUE, IOWA

Tech

NPN's WASHINGTON DIRECTORY of Oil Agency Headquarters

Following is a partial list and directory of governmental agencies in Washington dealing with matters affecting the oil industry. (List is as accurate as possible but is only tentative as room and phone numbers are constantly changing.)
Abbreviations code: Rm for room; Ex for phone extension.

Office of Petroleum Administration for War

New Interior Bldg., 18th and C Sts., N.W.
Phone REpublic 1820

General Information—**Mrs. Rosalie E. Reid,** Rm 6635, Ex 3429-4820.

Administrator
Harold L. Ickes, Rm 6156, Ex 5000.

Deputy Petroleum Administrator
Ralph K. Davies, Rm 6654, Ex 3831.
Bernice Kirschling, personal assistant to Davies, Rm 6654, Ex 3831.
H. Chandler Ide, assistant to Davies, Rm 6654, Ex 3833.
Dr. Frederick H. Harbison, labor counselor, Rm 6640, Ex 2054.
L. S. Fish, director of organizational planning, Rm 6621, Ex 4813.

Special Assistants
Joseph A. Fanelli, Rm 6132, Ex 5084.
Dr. John W. Frey, Rm 7424, Ex 4272.
Howard T. Mather, Rm 4448, Ex 4626.
J. Elmer Thomas, Rm 6622, Ex 4735.

Assistant Deputy Petroleum Administrators
Robert E. Allen, Rm 6514, Ex 4401.
E. E. Robbins, chief industrial specialist, Rm 6518, Ex 2455.
Elmer E. Batzel, special assistant to Allen, Rm 6520, Ex 2181.
Earl J. Opal, chief of review and clearance section, Rm 5226, Ex 2156.
H. M. Kent, chief of salvage and reclamation section, Rm 4346, Ex 4534.
Bruce K. Brown, Rm 6623, **Ex 2066.**
E. DeGolyer, Rm 6631, Ex 4459.

Administrative Division
Eric L. Kohler, executive officer, Rm 6415, Ex 4174.
E. J. Skidmore, Director, Rm 6412, Ex 4363.
Mrs. Bernice Ryan, Publications, Rm 6070, Ex 4615.

Public Relations Division
Gordon Sessions, director, Rm 7515, **Ex 3161.**
Herbert A. Yocom, assistant director, Rm 7515, **Ex 3181.**

Division of Reserves
William B. Heroy, director, Rm 7516, Ex 4454.

Facility Security Division
W. D. Mason, director, Rm 5213, Ex 4172.

Foreign Division
James T. Duce, director, Rm 4212, Ex 4417.
William D. Crampton, associate director, Rm 4209, Ex 4788.
C. Stribling Snodgrass, associate director, Rm 4218, Ex 2968.
A. H. Chapman, assistant to director, Rm 4214, Ex 2655.
Lester H. Nuland, assistant to director, Rm 4221, Ex 2534.
Grover Rees, special legal assistant, Rm 4227, Ex 2568.
Howard L. Freeman, foreign materials specialist, Rm 2222, Ex 4461.
J. F. Griffis, foreign requirements analyst, Rm 4226, Ex 2789.
H. A. Hassan, Lend-Lease specialist, Rm 4225, Ex 2921.
L. A. Mekler, Russian specialist, Rm 4219, Ex 4463.

Legal Division
J. Howard Marshall, chief counsel, Rm 6515, Ex 4100.
Mortimer A. Kline, associate chief counsel, Rm 6519, Ex 4481.
Robert E. Friedman, assistant chief counsel, Rm 6519, Ex 668.
Adolph H. Levy, principal attorney, Rm 6620, Ex 4838.
Wallace E. Avery, principal attorney marketing division, Rm 4248, Ex 2978.
John F. Jones, principal attorney production division, Rm 7415, Ex 3298.
George A. Wilson, principal attorney transportation division, Rm 5408-A, Ex 4898.
Justin R. Wolf, principal attorney natural gas & natural gasoline division, Rm 6525, Ex 2130.

Marketing Division
(Vacancy), director, Rm 4257, Ex 4646.
(Vacancy), assistant director, Rm 4258, Ex 3518.
Joseph B. Ellender, chief of economics and analysis section, Rm 4258, Ex 2302.
D. C. Arnold, chief of asphalt section, Rm 4020, Ex 2715.
Howard Cooper, chief of lube oils and containers section, Rm 4244, Ex 4313.
Robert W. MacMillan, chief of marketing equipment section, Rm 4038, Ex 2781.
Kenneth Darling, chief fuel oil section, Rm 4251, Ex 4440.
Hamilton H. Wende, chief of facilities section, Rm 4347, Ex 4751.
John Downing, chief of motor fuels section Rm 4026, Ex 2881.
Joseph H. Thompson, chief of administrative section, Rm 4255, Ex 4797.

Materials Division
Frank A. Watts, director, Rm 5312, Ex 4585.
Howard C. Turner, assistant director, Rm 5308, **Ex 2736.**
Lewis W. Breyfogle, allocations and allotments, Rm 5324, Ex 3683.
H. R. Hansen, materials applications, Rm 5314, Ex 4622.
W. L. Clark, production requirements planning, Rm 5224, Ex 2721.
I. G. Harmon, projects, Rm 5323, Ex 2406.

Natural Gas and Natural Gasoline Division
E. Holley Poe, director, Rm 7314, Ex 4736.
Paul M. Raigorodsky, assistant director, Rm 7314, Ex 4774.
Dr. Frank H. Dotterweich, consultant, Rm 7326, Ex 4840.
James E. Pew, chief of natural gasoline section, Rm 7318, Ex 4871.
John H. Thacher, Jr., technical consultant, Rm 7340, Ex 4840.
Charles E. Webber, senior analyst (natural gasoline) Rm 7320, Ex 3350.
Robert W. Ducker, chief of natural gas section, Rm 7322, Ex 2524.
Thomas R. Weymouth, consultant, natural gas section, Rm 7326, Ex 4840.

Petroleum Supply Division
Robert Lee Minckler, director, Rm 5210, Ex 4834.
R. C. Sauer, assistant director, Rm 5210, Ex 2083.
Lucien Craig, assistant director, Rm 5210, Ex 2083-4834.

Production Division
Donald R. Knowlton, director, Rm 7410, Ex 4231.
Ralph J. Schilthuis, assistant director, Rm 7416, Ex 2907.
Millard K. Neptune, assistant to director, Rm 7410, Ex 4826.
David G. Hawthorne, chief of materials and equipment section, Rm 7416, Ex 2062.
Joseph Gordon, chief production development section, Rm 7423, Ex 2984.
R. V. Shirk, principal production consultant, Rm 7444, Ex 2453
M. G. Hoffman, Rm 7429, Ex 4509.

Refining Division
E. D. Cumming, director, Rm 5257, Ex 3233.
Phillip M. Robinson, assistant director, Rm 5260, Ex 4786.
Robert B. Cragin, chief of supply section, Rm 5024, Ex 3237.
Douglas P. Bailey, chief of operations section, Rm 5040, Ex 4877.
Max B. Miller, chief of construction section, Rm 3310, Ex 4560.
George Parkhurst, chief of facilities section, Rm 5254, Ex 3941.
Dr. M. R. Mandelbaum, acting chief of process development section, Rm 5255, Ex 4832.

Research Division
Edward B. Swanson, director, Rm 7315, Ex 649.
C. D. Lockwood, assistant director, Rm 7317, Ex 4777.

Petroleum Supply and Distribution Board
Walter R. Lange, secretary, Rm 5423, Ex 4744.
Joseph Winterberger, chief supply technician, Rm 5425, **Ex 4437.**

Division of Reserves
W. B. Heroy, director, Rm 7516, Ex 4454.

Transportation Division
Maj. J. R. Parten, director, Rm 5412, Ex 4418.
W. C. Kinsolving, assistant director, Rm 5414, Ex 3557.
Lee R. Cowles, assistant director, Rm 5413, Ex 3658.
Walter R. Lange, assistant director, Rm 5423, Ex 4744.
Donald A. Sears, chief of pipeline section, Rm 5418, **Ex 4833.**
Boyd Wilson, chief of tank car section, Rm 5415, **Ex 4620.**
S. D. Archbold, chief of inland waterways section, Rm 5045, **Ex 4333.**
Arch Turner, chief of motor transportation section, Rm 4446, **Ex 4300.**
Frank I. Brinegar, chief of appraisal section, Rm 5418, **Ex 4627.**

WPB Representatives at PAW
R. R. McLachlen, Controlled Materials Plan representative, **Rm 6520, Ex 4616.**
M. C. Schoenly, distribution officer, Rm 5230, Ex 4617.

Liaison
Gen. Walter B. Pyron
Liaison agent between Army Department and OPC, Rm 4D577, **Ex 5042,** Pentagon Bldg., Arlington, Va., REpublic 6700.

War Production Board

New Social Security Bldg., 4th and Independence Ave., S.W., Phone REpublic **7500.**
Donald M. Nelson, chairman, Rm 5055, Ex 2113.
C. E. Wilson, executive vice-chairman, Rm 5037, Ex 2134.
William L. Batt, vice-chairman, Rm 5055, **Ex 2212.**
Stephen E. Fitzgerald, director, division of information, **Rm 5525A, Ex 5242.**
Donald D. Davis, Rm 5006, Railroad Retirement Bldg., Ex 3394.
Paul C. Cabot, Chief of salvage branch, 10th floor Gas & Light Bldg., Ex 71592.
E. W. Greb, Deputy director of salvage branch, 9th floor Gas & Light Bldg., Ex 72398.
R. T. Lawrence, oil unit head, 9th floor WGLB, Ex 72355.

Liaison, WPB-OPC-RFC
R. Otis McClintock, Rm 5193 A, Ex 71181.

Rubber Administrator, New Municipal Bldg.
William Jeffers, Rm 5027, Ex 3256.
Bradley Dewey, Deputy Rubber Administrator, Rm 5005, Ex 2455.

Office of Price Administration

Federal Office Bldg., No. 1, 2nd and D St., S.W., Phone REpublic **7500.**
Prentiss M. Brown, price administrator, Rm 4130 Census Bldg., **Ex 5586.**
Clyde Herring, special assistant, Rm 1131, Ex 76307.
Dr. J. K. Galbraith, deputy administrator in charge of price, **Rm 5131 B,** Ex 5203.
W. Page Keeton, chief of petroleum and petroleum products branch, Rm 6308, Ex 72519.
Michael Joel, administrative officer petroleum section, **Rm 6305, Ex 5389.**
George Doffing, price executive of petroleum section, Rm 6305 A, Ex 5388.
Joseph H. Salmon, associate price executive, **Rm 6304 A, Ex 6376.**
Robert Collacott, head of marketing section, Rm 6313, **Ex 6636.**
Edward W. Doherty, chief of economic analyst unit, Rm 6316, **Ex 6370.**
Peter Jensen, head of fuel oils unit, marketing division, **Rm 6314, Ex 4916.**
Leo Van Herpe, chief of fuel section accounting division, **Rm 6320, Ex 5539.**
Watson B. Joyes, head of crude oil production section, **Rm 6315, Ex 4403.**
Joel Dean, chief of fuel rationing division, Rm 258 Temp. D Bldg., **Ex 73411.**
Sumner T. Pike, director fuel price division, **Rm 6306-B, F. O. Bldg.,** Ex 76288.

U. S. Tariff Commission

7th & F St., N.W., Phone NAtional 3947.

Petroleum Accounting Section
Kenneth L. Stone, chief, Rm 155, Ex 123.

Office of Defense Transportation

Interstate Commerce Commission Bldg., Constitution Ave. & 12th St., N. W., Phone REpublic 7500.
Joseph B. Eastman, director, Rm 5136, Ex 3527.

Division of Petroleum and Other Liquid Transport
Fayette B. Dow, director, Rm 5132, Ex 73207.
Porter L. Howard, associate director, Rm 5108, Ex 72795.
H. R. Lewis, assistant to director, Rm 2367, Ex 73548.
Joseph E. Keller, consultant on state barriers, major transportation corps, Rm 2367, Ex 72216.
Gladys D. Feuerstein, administrative assistant, Rm 5128, Ex 71561.
R. W. Shields, associate director of pipeline section, Rm 6310, **Ex 2635.**
A. A. Dibbel, chief, Rm 6310, Ex 2635.
A. W. Bourque, associate director, tank car service section, Rm 4318, Ex 75407.
G. E. Everett, chief of petroleum unit, Rm 4318, Ex 74091.
Harlan P. Ross, assistant chief petroleum unit, Rm 4318, Ex 75407.
George W. Reynolds, chief of other liquids, Rm 4314, Ex 75829.
J. G. Scott, counsel, Rm 5418, **Ex 2460.**

Motor Transport Division
John L. Rogers, director, Rm 4211, Ex 2297.
Sam F. Niness, chief of petroleum carrier section, **Rm 2406 New P.O. Bldg.** Ex 2254.
W. I. Cumming, chief of vehicle maintenance section, Rm 2405 New P.O. Bldg. Ex 72731.
T. L. Preble, consultant, vehicle maintenance section, **Rm 4215 Labor Bldg.,** Ex 72775.
R. D. Thomas, chief of tire maintenance section, **Rm 4209, Labor Bldg.,** Ex 71446.
H. H. Kelly, chief of allocation section, Rm 2123, Ex 2206.

Congress

Congressional Oil Investigating Committee
Rep. Clarence F. Lea, Calif., chairman, New House Office Bldg., **Rm 1535,** Ex 699.

Senate Oil Shortage Investigating Committee
Sen. Francis Maloney, chairman, Senate Office Bldg., **Rm 354, Ex 1196, Phone** NAtional 3120.

Petroleum Industry War Council

Rm. 919 Commonwealth Bldg., 1625 K St., N. W., Phone DIstrict **2820.**
William R. Boyd, Jr., chairman.
Allan H. Hand, secretary-treasurer.

U. S. Maritime Commission

Rm. 4309, Ex 87, 88, 89.
B. B. Jennings, director of tanker operations, **War Shipping Administration,** Commerce Department, Phone REpublic **6620.**

NATIONAL PETROLEUM NEWS—April 7, 1943—Vol. XXXV—No. 14
Published every week at 1213 West 3rd St., Cleveland, Ohio, U.S.A. Subscription rate $5.00 per year in United States, Mexico, and Pan-American countries; $6.50 Canada and foreign countries. Entered as second class matter Jan. 17, 1910 at Cleveland, O., post office under act of March 3, 1879, by The National Petroleum Publishing Co.
Copyright 1943 The National Petroleum Publishing Company.

Walter Hochuli . . . Appointed PAW Director of Marketng

Executive ability of a quality that doesn't develop overnight will be shifted from the guidance of Texaco's operations in its central territory to the guidance of marketing operations of the entire oil industry when Walter Hochuli takes over his new job April 12 as director of marketing of the Petroleum Administration for War.

Mr. Hochuli has been in every whistle stop in The Texas Co. and has learned oil marketing from the inside out, and vice versa. Too, every time the whistle blew he has made a dozen friends. It doesn't require any kind of a search to find an oil man who has these things to say about the new marketing director: he has a knack of getting at the heart of problems; he's a clear thinker who expresses himself freely and frankly; he's unbiased and dependable.

In his 18 years with Texaco, Mr. Hochuli has become friend and counsellor to hundreds of subordinates. He expects performance and gets it. But at the same time he's quick to praise, makes it a habit to write personal letters commending extra effort. Gifted with a "photographic memory" he can meet you once and call you by name a year later. This trait has both pleased and surprised many dozens of Texacoans; if something was to have been done on the 15th, he'll ask, on the 16th, why it wasn't done—and from memory.

Born at Schenectady 47 years ago, Mr. Hochuli went to public school there, then finished up at Union College in 1918—immediately joining the Marines. He came out of officer's training school at Massachusetts Tech as a second lieutenant and was stationed at Parris Island and the Philadelphia Navy Yard.

In 1924 Mr. Hochuli was attracted into the oil business and started with Texaco as a salesman in Norristown, Pa. Promotion came rapidly—bulk station agent, zone representative, operating auditor, special representative, superintendent of service stations, assistant district manager.

By then, Texaco had acquired Indian Refining Co. and Mr. Hochuli went to Lawrenceville, Ill., as assistant manager in charge of sales. In 1934 he returned to Texaco in Chicago as assistant manager in charge of sales for the central territory, covering 15 mid-western states. He became vice-president of Indian Refining in 1937 and in 1938 was named manager of Texaco's central territory.

Married since 1920 to a girl he had known from kindergarten, Mr. Hochuli's family includes 3 children—Walter, Jr., 21, in officer's training school for the Marines at Quantico, Va.; Alice, 16, in high school; and Bob, 12, in grammar school. Mr. Hochuli's family will continue to reside in Winnetka, a suburb of north Chicago.

NATIONAL PETROLEUM NEWS

VOLUME 35 WEDNESDAY, APRIL 7, 1943 NUMBER 14

50c Crude Hike?

No Action Yet—as for Several Months —But Reports Indicate Move Soon by PAW: Not for a 25c, but for a 50c Hike. Ickes Chagrins Producer Group

NPN Staff Special

WASHINGTON—Crude oil price increase is still up in the air—where it has been for months—but optimism is growing in oil circles that PAW will recommend a boost.

Exact amount of the increase PAW will recommend remains to be seen, but straws in the wind indicate it may be as much as 50c per bbl. Petroleum Industry War Council several weeks ago urged a 25c per bbl. increase, but talk of a 50c increase is arising.

NPN learned that a staff recommendation had gone to Deputy PAW Davies calling for a larger increase than 25c, perhaps as much as 50c. Rep. Gavin, Pa., urged a 50c increase on the floor of the House.

It was understood, too, that there is some sentiment among council members for PIWC to change its former recommendation from 25 to 50c per bbl.

PAW Ickes may receive his staff's recommendation on the question of higher crude prices before the week is out.

Ickes Chagrins Producer Group

While optimism exists now, there was uncertainty after Mr. Ickes cut short a projected conference with independent producers who

(*Continued on page 7*)

Manpower Is 'Hot' Topic As PIWC Discusses Marketing Deferment

NPN News Bureau

WASHINGTON — Manpower was a "hot potato" as PIWC began its monthly deliberations on April 5.

Both marketing and production committees spent some time discussing the manpower problem. In the production committee, revision of list of essential occupations reportedly was discussed.

Marketing committee took up the question of deferability of marketing employes. Situation is still that marketing must prove its essentiality and the need for occupational draft deferments before WMC places it on the essential list.

Marketing committee reportedly was told that it would be difficult to class petroleum distribution as an essential activity nationally for employment purposes, aside from the draft angle, but that tight situations arising in marketing employment might be handled locally by WMC.

That is, if oil marketers ran into trouble hiring employes they could take it up with area or regional WMC offices and try to get relief that way.

Meantime, WMC announced its Bureau of Manpower Utilization would have "consultants" in almost every industrialized area by mid-summer. These consultants, WMC said, will go into plants upon request and work out with management the best means of utilizing the labor available.

Conversion Dimout

Theme of Propaganda for Next Winter Likely to Be on Conservation Instead of Oil-to-Coal Conversion. Overall Policy Now Being Mapped by WPB Group

NPN News Bureau

WASHINGTON — There are signs that the government is easing up on its oil-to-coal conversion campaign.

Instead of propaganda for converting domestic oil burners to coal, the emphasis will be shifted to heat conservation so as to save on all types of fuel next winter.

PAW has been working with Office of War Information on a radio campaign, to start May 3, urging home insulation, weather-stripping, storm windows, and other heat conservation measures. It will be aimed at consumers of coal, gas and other fuels as well as oil.

PAW Ickes and Deputy PAW Davies have been plugging away for conversion of all oil-burning equipment, using radio, press releases, speeches, magazine articles, and other media. But a high-ranking PAW official admitted to NPN April 6 that there would probably be an easing up now on PAW's domestic conversion campaign.

Sets Overall Policy

Overall government policy on oil-to-coal conversions is being mapped by a committee appointed by WPB Chairman Nelson. Heading it up is John J. Hall, of WPB, who came here from American Radiator Co. This committee includes Robert E. Allen, assistant deputy petroleum administrator; Joel Dean, OPA fuel rationing chief; and representatives of civilian supply, defense transportation, and other agencies.

Tentatively, this committee decided, according to a PAW source, that there would be no mandatory conversion of domestic burners and that industrial conversions would be on a "selective basis"—with coal supply as the limiting factor.

Some areas, such as Georgia and Florida, the Pacific Northwest, and other sections where coal is scarce will probably be left out of any conversion drive. Also, there is likely to be an easing up in mid-western oil areas where coal is shipped in.

There have been reports in the industry that OPA favors putting a "ceiling" on industrial conversions in New England, exempting all installations which use 10,000 gal. or less per year.

Illinois Fuel Oil Probers Dig for More Facts

Special to NPN

SPRINGFIELD, Ill.—A second batch of testimony on the griefs and maladjustments of fuel oil rationing in Illinois is due around April 13, when the legislative committee appointed to investigate the situation is slated to hold its second meeting. The first session was held March 3 and the inquiry continues to gather new information, according to Sen. Earle B. Searcy, committee chairman.

Further public hearings at which local rationing boards would present their views are being strongly urged by Rep. Hattie Holman O'Neill, a committee member, according to Mr. Searcy.

Asks Appointment of Independents To Help Redraft Pooling Order

NPN News Bureau

NEW YORK—Appointment of a committee of independent primary suppliers and one of secondary suppliers to participate in a redraft of PAW Recommendation 59 (east coast pooling) has been recommended to PAW and industry committees involved by Clyde G. Morrill, Boston, Secretary, Atlantic Coast Oil Assns. Conference.

Mr. Morrill said this would assure that changes were made in No. 59 to avoid difficulties independent primaries and secondaries had this past winter.

Phillips Resigns District 2 Post

NPN News Bureau

CHICAGO — Frank Phillips, Bartlesville, Okla., founder and chairman of the board of Phillips Petroleum Co., resigned April 1 as chairman of the general committee, District 2, due to ill health.

"I have just returned from a month's observation at Washington University Barnes Hospital, St. Louis," Mr. Phillips said, "and at my doctor's insistence I have today (April 1) tendered my resignation as chairman of the general committee of the Petroleum Industry Committee for District 2, to Petroleum Administrator Harold L. Ickes."

CHICAGO OIL ROUNDUP

:: *News and Gossip in the Mid-West* ::

By EARL LAMM, NPN Staff Writer

CHICAGO—Increasing shortage of help to man petroleum transports continues to worry the industry. In addition to drivers, the shortage of mechanics to repair the trucks, with the limited supply of parts, constitutes a problem.

However, members of the new Office of Defense Transportation committee appointed to work out a national trainee program are busy. They meet in Washington with ODT officials this week. Howard L. Willett, Jr., Chicago member of the committee and official of The Willett Co., transport haulers, has some ideas on the subject.

Must Settle Draft First

Draft status of transport drivers and mechanics should be cleared up first, he thinks. Uncertainty on that question is causing many such employes to leave and get into other work. Other shifting decisions at Washington add to the unrest, according to Mr. Willett, who pointed out that a driver-mechanic trainee program is a 2 to 4-year proposition—not one of only 2 to 4 weeks. Trainees should not only be permitted but encouraged to remain on the job for the full period, he said. Retaining men under present conditions is difficult. He cited the experience of his own company.

"We have had a 4-year apprenticeship course in our own company for several years," he said. "On Jan. 1 of this year, we had 8 men. April 1 we had 10 men. In between those dates we took on 8 new men, only 2 of whom stuck. The other 6 left. The turnover is terrific. Some of the men got scared about the draft and other uncertainties while others went to war plants where the pay is better."

Stymied on Wage Hike

About a year ago, trainees were given a 15% wage increase and under the Little Steel formula are not yet entitled to any more, so Willett's application for a permit to increase wages was turned down.

With these problems out of the way, selection of the proper type of men to receive driver and mechanic instruction is highly important, Mr. Willett explained. Men with at least some trucking experience to start are required he said. Petroleum trucks are heavy and demand extra ability to handle them. Women drivers could be put on the smaller trucks and on light shop jobs, but the union has objected in some instances. However, the union has cooperated with Willett in the apprenticeship program for men.

° ° °

Northern Illinois Service Station Operators Assn. will meet at the Nelson Hotel in Rockford, Ill., on April 8 to discuss PAO No. 4, regulating hours of gasoline sales, and to develop suggestions for amending the order. President W. R. Girling of the association said he had checked with war plants and rural service stations in the area and found that stations could best serve by remaining open 12 consecutive hours on week days and closing on Sundays.

"Most small town stations close at 7 p.m. now anyway. Farmers have gasoline in storage on their farms and seldom come to service stations at night," he said.

° ° °

Office of Price Administration is not unsympathetic toward the problem of wider jobber margins, George W. Doffing, price executive, wrote A. C. Gienapp, secretary of the Iowa Independent Oil Jobbers Assn., on March 22. His letter was in reply to one from Mr. Gienapp enclosing copy of resolution urging a wider margin, passed by the Iowa association at meetings held in February, which were attended by over 700 members.

"With respect to certain depressed tank wagon prices," Mr. Doffing explained, "we trust that action will soon be forthcoming."

Senators and representatives, to whom Mr. Gienapp also sent copies of the resolution, replied that they were taking the matter of better margins up with Price Administrator Brown and other officials.

° ° °

A canvass of big jobber organizations in the Mid-West indicates that distributors and service station operators are skeptical about official Washington granting dealer-jobber margin increase as was indicated.

However, the jobbers are withholding further action until receipt of copies of the jobber questionnaire being prepared by the special industry committee working with the petroleum administrator and the Office of Price Administration.

° ° °

Office of Defense Transportation at Washington is considering a total of 31 separate plans for local deliveries, Frank Baird-Smith of the petroleum transport division, ODT, Chicago, told the Chicago Oil Men's Club at its Thursday luncheon.

The plans were received from truck owners, operators, and associations over the nation, Mr. Baird-Smith said, and ODT hopes that some new and workable order to save rubber, manpower, and equipment will develop out of them.

° ° °

Several service station operators from District 2 plan to attend the joint meeting of retailers from 13 eastern states to be held at the Ben Franklin hotel in Philadelphia April 10-11.

° ° °

Chicago has a new zoning ordinance in the making which would affect a considerable number of service stations in the business district. As it now stands, the ordinance would limit service station storage of inflammable liquids and oils to 200 gal. above ground and 5000 gal. underground. The ordinance was first voted at the city council meeting March 18, and comes up for a final reading April 9, after which it will be advertised and made effective unless revised.

Production of oil fields in the state of Illinois continues below the quota set by Petroleum Administrator Ickes. The March proration total was fixed at 262,300 b/d, while actual daily production for the week ending March 6 was only 238,000 b/d; March 13, 251,900 b/d; March 20, 229,500 b/d and March 27, 228,200 b/d.

These average daily production figures compiled by American Petroleum Institute are being quoted by PAW, District 2, in answer to inquiries as to why the monthly quota for April was reduced approximately 10,000 b/d to 251,900 b/d.

° ° °

Lawyer-oil man's philosophy on government: "You remember back in 1920's, particularly 1928-29, a great many young people graduating from universities then had the notion that the world owed them a living? Well, what's the trend of government now? Those kids have grown up and, after 15 years or more, are hitting their stride in the business world and in government—either voting, running for office or are on the government payroll.

"The New Deal is a deep rooted outgrowth of that—40-hr. week, high wages with time and a half for overtime, pay when not working, and otherwise social security from cradle to grave. Something for nothing—take from those who have and give to those who don't have."

B.O.D.A. Says Joel Dean Tried to Discredit It

NPN News Bureau

CHICAGO—Burning Oil Distributors Assn, in a report to its members on April 5 charged Joel Dean, OPA fuel oil rationing head, with an apparent attempt to discredit the association and its president, Frank E. Spencer, of Spencer Petroleum Co., in the eyes of the fuel oil industry. Basis of the charge was Mr. Dean's alleged refusal to admit Mr. Spencer to the joint OPA-fuel oil industry advisory council conference in Washington March 16-17.

A report on the conference was given to about 20 fuel oil men at a meeting here April 2 by Mel Keim, Apex Motor Fuel Co., and M. R. Holmgren, Hughes Oil Co., both of Chicago. Four-man committee was appointed to consider apparent results of the Washington conference, and to study the conversion program to see what can be acceptable to the public and the fuel oil industry.

Committeemen named were C. R. Jonswold, Triangle Oil Co.; Mr. Holmgren; R. F. Doepal, Braun Brothers; and Julius Loeffler, Commerce Petroleum Co. All are from Chicago.

In the report to members, B.O.D.A. said Mr. Spencer went to Washington in his official capacity as president of the association to attend the advisory council meeting with OPA, and Mr. Dean denied him admittance. This, B.O.D.A. contends, was a reflection on Mr. Spencer and on B.O.D.A., or in effect an assertion that Mr. Spencer does not actually or accurately represent the association membership. He has had long experience in the industry and is serving his 10th year as president of the association.

The B.O.D.A. report is supplemented with excerpts of 37 letters from fuel oil industry applauding Mr. Spencer and expressing surprise that Mr. Dean denied him admittance at the Washington meeting.

District 3 Shuns 'Joint Use'

Subcommittee Report on Surveys Recommends Industry Action To Raise Internal Efficiencies; Free Enterprise, Changes Made are Stressed

Special to NPN

HOUSTON—Many economies are constantly being effected in the marketing of petroleum in District 3 and no plan involving the pooling of bulk stations should be adopted at this time, the District 3 joint use of marketing facilities subcommittee reported to the marketing committee Mar. 17. The subcommittee's report was approved by the marketing committee and released April 2.

The report released here omitted statistical summaries of the survey counties—8 in all compared with 19 in District 2—and included only general comments and recommended action. Recommendations of the subcommittee, headed by A. F. Reed, El Dorado, vice-president of Lion Oil & Refining Co., follow:

1—**Resale outlets**—According to grade and kind of product delivered, limit dump size of motor fuel to either full load or 60% (or nearest quantity to that percentage based on one or more full compartments) of dealer's storage capacity. Reasonable exception to this rule being permitted to dispose of balance of product remaining in delivery unit after any dump or multiples of dumps based on 60% or nearest equivalent of dealer's storage capacity have been made.

2—**Commercial and industrial consuming accounts**—According to grade and brand of motor fuel delivered limit bulk delivery to either full load or 60% (or nearest quantity to that percentage based on one or more full compartments) of storage capacity, but in no event to be less than 200 gal. or nearest full compartments. Prohibit bulk deliveries into fuel tanks of motorized equipment.

3—**Farm accounts**—Deliveries of motor fuel to be limited to a minimum of 40 gal. unless other petroleum products are a part of the delivery.

NOTE: Define farm accounts as in Order M-68-c.

4—**Private consuming accounts**—Deliveries of motor fuel to be eliminated. (For purpose of proposed order, a private consuming account is an account using motor fuel for other than commercially licensed vehicles.)

5—**Government agencies**—Deliveries of motor fuels and kerosine limited to full tank truck capacities or 60% of storage capacity or nearest full compartment to that quantity. Deliveries to Army, Navy, Maritime Commission and Lend-Lease are not subject to these provisions.

6—**Orders for delivery**—To permit of proper dispatching and conservation of time and mileage, petroleum marketers shall not be required to make deliveries in less than 48 hours following receipt of orders.

7—That a maximum use of purchases and exchanges, including exchanges at bulk plants be negotiated and perfected to an extent even greater than now practiced.

8—Elimination of "call-backs": A call-back being any call by a tank motor vehicle to the same premises of any one person subsequent to the first call on any given day for delivery of the same product. It does not include calls made for the purpose of servicing, repairing, or maintaining such vehicles. There shall not be made more than one delivery to any point of destination during any calendar day except where necessary to complete an order exceeding the capacity of the vehicle making the first delivery.

9—An educational program vigorously prosecuted by the industry with petroleum users, so that they will understand it is positively essential to reduce delivery service in order to effect economy in miles traveled and to conserve automotive equipment.

10—That a very careful study be made to ascertain the best, most economical plan to solve the coupon collection problem and conserve the time of truck drivers, not only to service stations but farm accounts as well.

11—That permission be granted to transfer service station equipment from permanently closed idle stations to existing and operating service stations, and farm or commercial accounts, in order to increase storage capacity and facilitate larger deliveries and more efficient operation.

8 Acres Surveyed

The study of the possibilities of the joint use of marketing facilities program in District 3 was centered around 8 survey areas—Jefferson county, Ala.; Jefferson county, Ark.; Iberia Parish, La.; Pike county, Miss.; Chaves county, N. M.; Harris, Lubbock and Navarro counties, Tex. The areas represented as nearly as possible a cross section of marketing conditions in District 3, including farming, ranching, manufacturing, refining, shipping and metropolitan areas.

The joint use subcommittee, as result of its study of the survey reports, is "of the opinion that many economies are constantly being put into effect in the marketing of petroleum products. . . . It was felt that conditions have substantially changed since September, which was the month selected for the survey. Service stations have closed for economic and manpower reasons and a number of bulk plants have been discontinued. Exchanges of products are being made at many points. Economies in truck deliveries have already been made as shown by the county surveys which list numerous trucks already taken out of operation and held in reserve."

Use of Manpower Down

The subcommittee commented further that the surveys show the petroleum industry has generously responded to the war demand and that the use of manpower in the marketing of petroleum products has been "drastically reduced".

"Because of enlistment, the draft, and removal to war industries, many filling stations and bulk plants are now being operated by women or men not qualified for other work either by age or health," the subcommittee said.

"The summaries of the county operators' reports, in some instances show substantial saving in equipment and manpower under complete consolidation of plants. Since these figures are all based on September, many of these savings have already been accomplished by individual action.

"It is the opinion of your committee that any plan involving the pooling of bulk station facilities should not be adopted at this time. Such a plan would eliminate free enterprise and remove the spirit of competition in the petroleum industry. The operators' reports do not include the additional clerical and supervisory manpower which would be required to place such a plan in effect and supervise its operations. It is felt that a plan of operation such as contained in the interim suggestions adopted by the District 3 marketing committee at its January meeting would bring effective and quicker results."

Nolo Contendere Pleas Filed in Pump Suit

NPN News Bureau

CHICAGO — Justice Department's antitrust suit against computer pump manufacturers was continued to April 23 by Judge Phillip L. Sullivan in U. S. District court this morning.

Wayne Pump Co. and B. F. Geyer, president, and Gilbert and Barker Mfg. Co. and S. C. Hope, president, offered pleas of *nolo contendere*, which pleas Judge Sullivan is taking under advisement. In continuing the case he allowed time for other defendants to make answer.

Wayne and Gilbert and Barker asserted they were engaged 100% in war work and that a lengthy trial would interfere; also that no pumps are now being manufactured for commercial use. Wayne further stated that condition of which the government complained; that is, price fixing and monopoly, had been discontinued through revision of contracts with its licensees.

Wayne Explains Action

In explanation, Wayne said:

"At the time The Wayne Pump Co. entered into license contracts with other manufacturers of gasoline dispensing equipment embodying the Jauch, et. al, and other patents, it was done on the advice of reputable and competent counsel.

"During the life of these license agreements the interpretation of the law governing them has been altered by judicial decision until the Department of Justice now questions whether some of the provisions of the license agreements have become in violation of certain of the antitrust laws, thus making unlawful an agreement which at its inception was considered by the legal profession to be lawful and generally practiced.

"Defendants felt that the enormous investment in time and money which would be required to defend themselves against the suit was more than they considered the points at issue were worth. We have therefore pleaded *nolo contendere*, conceding the government's contention without admitting the correctness or incorrectness of the Justice Department's position."

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

WASHINGTON BUREAU, 1034-36-38 National Press Bldg. ● Telephone National 3477 ● A. M. PETTY, News Editor and Chief of Staff

Supply Enthusiasm Increases

Ickes, Pessimistic, Tries to Hold it Down as Transportation Picture Brightens. Hope for Eased Restrictions Backfires in Many Directions

NPN Staff Special

WASHINGTON—Despite PAW Ickes' warnings against "optimism" over the improved transportation outlook, he is having a difficult time keeping the lid on against pressure for lifting restrictions on east coast oil consumption.

Enthusiasm keeps bubbling up even among members of Mr. Ickes' own staff, as well as senators, congressmen, and other government officials. There was even a trace of optimism among members of Petroleum Industry War Council's economics committee headed by Dr. R. E. Wilson (Pan Am).

George Wilson, of PAW's transportation division, made newspaper headlines with a statement on Capitol Hill which was interpreted as forecasting the end of fuel oil rationing provided the pipeline and barge programs are completed as scheduled and gasoline rationing continues. Mr. Ickes later took issue with his aide, saying that military demands might be more than expected.

Claim 'Dupe' by Ickes

Meanwhile, the House appropriations committee, before which Mr. Wilson testified, had killed the Florida canal 21 to 19. Now, backers of the project claim Mr. Ickes "duped" the committee.

In the PIWC economics committee report, there is a left-handed suggestion that "A" gasoline ration coupons be restored to 3 gal. a week value in the East.

"Committee recommends" said the report, "that there be called to the attention of the proper authorities the desirability of balancing the military value of any increase in export availability resulting from such stricter rationing (that is, below 3 gal. per "A" coupon per week) against the effect upon the civilian economy, public transportation facilities, and the industrial war effort."

Report cited a District 1 forecast showing total supply as follows: 1943, second quarter, 1,437,000 b/d; 1943, third quarter, 1,637,000 b/d; 1943, fourth quarter, 1,665,000 b/d; and 1944, first quarter, 1,601,000 b/d. This does not include extension of the 20-in. products line all the way to eastern seaboard (approved by WPB) which would add another 50,000 to 100,000 b/d to estimated receipts. But deliveries of pumping equipment may be delayed. So, it has been suggested that the line be built with alternate pumping stations so that limited operation could be started sooner.

Question Short Rations

Improved transportation outlook has prompted other government agencies to question necessity of short rations on gasoline in the East, especially when one reason for reduced gasoline allocation was that industry must start now to build up fuel oil stocks for next winter.

OPA Chief Brown is reported to have written Mr. Ickes saying that the present "A" coupon value (1.37 gal. per week, averaged over 4 months) does not allow enough use of automobiles to keep them in good running order. American Automobile Assn. has taken similar stand. Congressional committees are being deluged with protests along same line. Mr. Ickes may be called upon to defend his position before an investigating committee.

Another result of the "optimism" over the oil outlook among other governmental departments is the growing opposition to PAW's oil-to-coal conversion campaign (*see story p. 3*).

Either May Be Right

Paradoxically, either PAW or its critics could be right. But few are in a position to decide which *is* right—and they can't tell because it's a military secret.

First duty of Mr. Ickes, as petroleum administrator—and the oil industry, too—is to lay down on the East Coast all of the petroleum products which the armed forces need or rather think they will need (the distinction is important). Civilians get what's left over. Strictness of rationing depends on amounts that are stated as needed for military requirements.

Two Variables Included

There are two variables in this situation—neither of which Mr. Ickes or the industry is in a position to question. They are: (1) have the armed forces overestimated their requirements? (2) will there be shipping available to lift such requirements?

There are some well-informed observers who believe that a more realistic analysis of military estimates would disclose more supplies available for civilian use than now expected by PAW.

Oil industry's hands are tied in this matter because military authorities have denied the PIWC figures on military demand for petroleum products. The PIWC economics committee has protested this, pointing out that this has thrown all of their calculations off.

Maybe a congressional committee or some other government agency can raise this issue. Sen. Maloney, Conn., has a bill (S. 885) which would set up a civilian supply administration with authority to challenge correctness of estimated military demands when they impinge too harshly on civilian requirements.

Margin Progress

Jobber Questionnaire Finished, WMC Interviewed & Pledges 'No Opposition'

NPN Staff Special

WASHINGTON—Bandwagon for increased gasoline margins rolls on, with completion of questionnaires to obtain supporting data from jobbers and dealers and both PAW and OPA officials promising that everything possible will be done to speed the matter.

The jobber questionnaire was drafted by a panel of 12 jobbers from 11 states meeting here April 1 and 2 with PAW and OPA officials and Dr. John D. Gill, Philadelphia, chairman of Petroleum Industry War Council's cost and price adjustment committee.

A group from the jobber panel also conferred with top-ranking executives of War Manpower Commission. They obtained a definite commitment that War Manpower Commission would *not* oppose either a dealer or jobber margin increase. Some weeks ago when OPA was on the verge of increasing dealer and jobber margins a minor official of the manpower commission intervened, opposing a dealer margin increase on grounds that a continued low margin would force station operators into war plant jobs. But the top officials in WMC have repudiated this. They told the jobber group that they would not use price to control manpower.

Group visiting the manpower commission consisted of F. L. Bond, Jacksonville, representing Florida Petroleum Marketers Assn.; A. W. Roth, Greensburg, Ind., chairman of National Council of Independent Petroleum Assns. and John Harper, Long Island City, N. Y., president, Empire State Petroleum Assn. They took along with them Harry Wainwright, Washington, representative of Eastern States Gasoline Retailers Conference,

who had previously negotiated with WMC officials.

Believing that their data already assembled is as accurate and complete as that anticipated from the official dealer questionnaire, New Jersey Gasoline Retailers Assn. has formally requested OPA to increase retail gasoline margins by 1c in north and central New Jersey.

John Dressler, Hackensack, N. J., president, pointed out that a manpower survey covering 512 stations—10% of the total in this area—has been filed with OPA (*see NPN March 31, p. 9*). Also, cost has been submitted on 42 representative stations.

Mr. Dressler, who is also chairman of the eastern dealers' conference, participated in drafting of the official dealer questionnaire. He believes that the New Jersey application will "smoke out" the attitude of OPA and PAW on margin increases, clearing the way for marketers in other areas to take similar action—if it should turn out that OPA wants to handle the matter on an area basis rather than regionally or nationally.

Seeks Conference with A.A.A.

On behalf of the eastern dealer's conference, Mr. Wainwright is seeking a conference with Thomas P. Henry, president, and other officials of American Automobile Assn. The dealer group wants to present data showing gravity of the manpower situation in automotive servicing and repair establishments. They feel that a breakdown in automobile transportation will result if something isn't done.

The A.A.A. president wrote to PAW Ickes on Mar. 24 that his executive committee had voted to oppose the 1c gasoline price increase (to provide increased margins for jobbers and dealers) recommended by the PIWC at its meeting last month.

Spokesman for the A.A.A. has admitted that the organization's executive committee did not consult with either industry or government representatives before declaring its opposition to a gasoline price increase.

Questionnaire Distribution Planned

The jobber panel, meeting at the petroleum administration, recommended that jobber margin questionnaires be distributed through state marketers' associations in states where there are such organizations. Where there are no state associations, questionnaire distribution will be handled by the PAW district marketing committees.

OPA officials have said that they would be satisfied with a 5% return on the questionnaires. Instead of sending out questionnaires broadcast and trusting that 5% will be filled out and returned, it was decided to select by lot a 5% sampling of jobbers in each state. In addition, a further sampling will be made in some of the larger metropolitan areas. State associations and district marketing committees will be asked to follow up on each questionnaire so that they are promptly filled out and returned.

Lists One Page of Questions

The questionnaire for jobbers covers only a page although there are several pages of instructions so that recipient will know exactly what information is sought for each of the 32 items. Before the questionnaire can become official, it must be approved by the federal budget bureau. But PAW officials anticipated no trouble from that quarter.

Dealer questionnaire must also be approved by the budget bureau.

Action Expected Soon On Crude Increase

(*Continued from page 3*)

came to present their side of the issue before the case is closed.

When the conference — which lasted less than 15 minutes — was over, General Counsel Russell Brown of Independent Petroleum Assn. of America said: "We were denied that opportunity."

Mr. Ickes told the independent producers — numbering about 20 and representing the crude oil requirements committee which is the voice of 35 producers' associations — that he did not have anything to discuss with them and would not have until his staff submits its report on crude prices.

The producers were not exactly happy when they left Mr. Ickes' conference room.

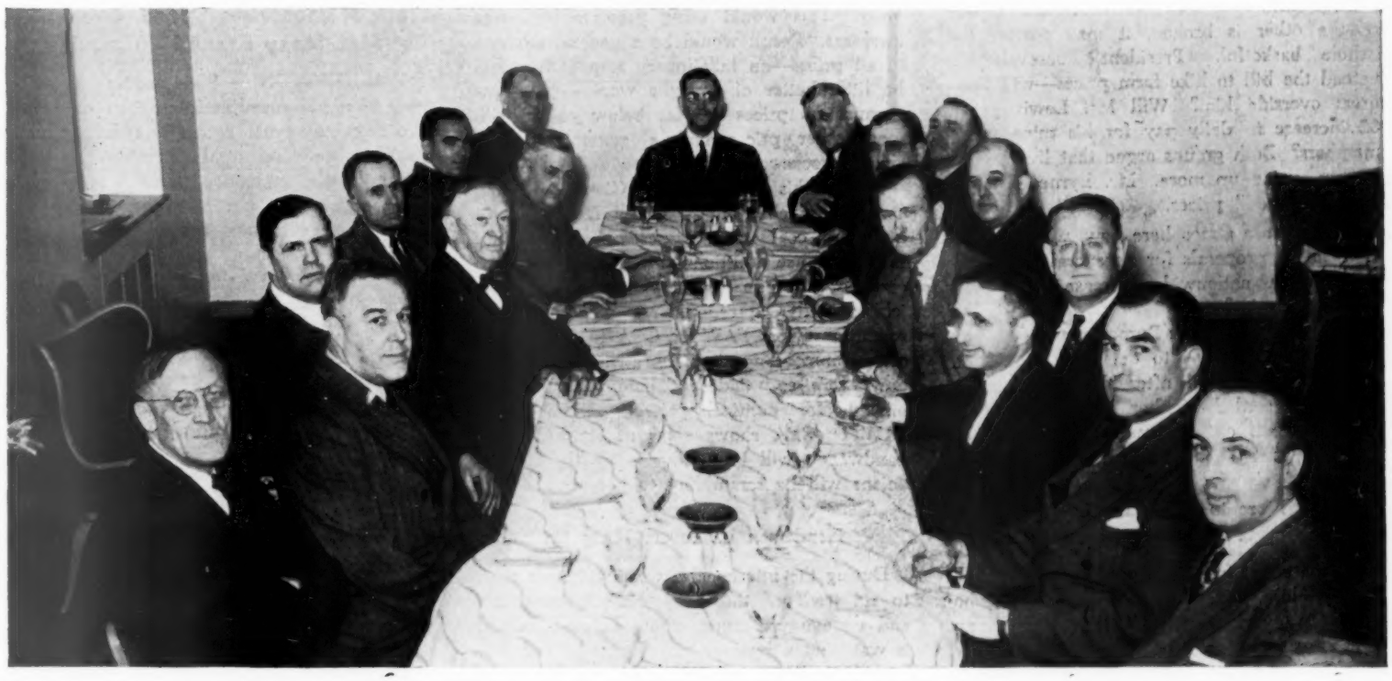
On April 6, the independents issued a statement asserting U.S. faces a critical oil supply problem and charging that "scant attention" is being paid to the problem of safeguarding oil supplies for war machines on which billions are being spent.

Urge Action Now

Independents, said the committee, are in a "depression" and the "appropriate action" that would allow them to find and produce oil must be taken.

Rep. Gavin, in the Mar. 30 *Congressional Record*, said a 50c per bbl. increase is needed if oil is to be produced. He criticized Deputy OPA Galbraith for being the "bottleneck" in both food and oil production.

The Pennsylvania congressman urged that OPA be cleaned of "visionary, impractical theorists, power drunk bureaucrats".



Independent producers, who met for 15 minutes with PAW Ickes while he told them he had nothing to say on crude prices until he had received a recommendation from his staff, reassembled at Washington's Statler Hotel to plan their next step. Around the table from left to right, they are: Don T. Andrus, Bradford, Pa.; Russell Brown, I.P.A.A. counsel; H. M. McClure, Alma, Mich.; J. Garfield Buell, Tulsa; J. P. Coleman, Wichita Falls, Tex.; John B. Cowden, Dallas; Charles P. McGaha, Wichita Falls, Tex.; C. E. Buchner, Tulsa; Frank Buttram, I.P.A.A. president; H. B. Fell, Ardmore, Okla.; E. B. Shawver, Wichita, Kans.; Walter Lechner, Dallas; J. K. Brim, Sulphur Springs, Tex.; A. W. Larkin, Houston; H. C. Cockburn, Houston; N. W. Shiarella, Owensboro, Ky.; O. L. Sturbois, Vincennes, Ind.; and J. V. Brown, Washington

Washington Outlook . . .

Background News and Opinion

By A. M. PETTY, NPN News Editor

WASHINGTON—Storm clouds are gathering in the West out where oil men are urging more direct action to get oil prices increased.

Producers out there feel this way: If more oil is needed, only way to get it is pay enough to find and produce it. So, why all the red-tape and palavering with economists?

Independent marketers, too, have difficulty understanding Washington's way of doing things. If both PAW and OPA believe a margin increase is justified, why not have Price Administrator Brown scratch his name on an order? He has the power, hasn't he, under the price control law?

But logic counts for nothing in Washington. Laws mean little when President Roosevelt is grinding out executive orders by the dozen, creating czars and super-czars who, in turn, issue orders themselves. So, we have Economic Czar Byrnes telling OPA not to grant any more general price increases without his OK which, he implies, will be hard to get.

Walking on Eggs Now

Just now Mr. Byrnes is walking on eggs in the anti-inflation fight. Biggest of those eggs are the farm bloc and John L. Lewis. If one or the other is broken, it may spatter the whole basketful. President Roosevelt has vetoed the bill to hike farm prices—will Congress override him? Will Mr. Lewis get a $2 increase in daily pay for his mine union members? Both groups argue that living costs are up, going up more. Mr. Byrnes says he has "stabilized" prices.

In this tense atmosphere now, what are the chances for proposals for a general crude advance or a nationwide increase in jobber-retailer margins?

To put it mildly, Mr. Byrnes would seek any excuse he could find to delay, if not reject, such proposals until after the two burning issues are settled. Either he quenches the fire or it gets out of hand. Meanwhile, he wouldn't want oil thrown on the fire.

More to Gain than Lose

If the farm bloc and coal miners win out, it will be easier for Oil to get its prices upped. If they lose, Mr. Byrnes will have to be tough on everybody else. Oil will need an airtight case to get any increases. So, there is everything to gain, nothing to lose, by taking time enough now to work up the best possible case for oil price increases.

Congressional pressure *might* force Mr. Byrnes to make a decision now but it's an odds-on bet that it would be adverse. That would be an obstacle hard to overcome later. More probably Mr. Byrnes would refuse to consider any general oil price increase now.

Mr. Byrnes could say:

On crude—wait until PAW and OPA submit their recommendations.

On margins—where's the supporting data? Why not wait until returns are in on the OPA-PAW questionnaire?

This is not to say that an individual oil company or a group—such as the northern New Jersey gasoline retailers—should not go ahead with an application for a price increase, provided they have a well-documented case now (as the New Jersey dealers have). Mr. Byrnes has frowned on *general* increases which apparently leaves the door open to individuals or local groups.

Needs Lot of Log-Rolling

There has been considerable talk of Congress "legislating" a price advance on crude. Some on Capitol Hill believe that this is beyond their powers. But, assuming that Congress has the power, it couldn't be done without much log-rolling. Oil votes would have to be traded for increases on lumber, cotton, farm products and other items to get a majority. This would bring pressure for wage increases. Result would be a general advance in all prices—an inflationary step. Oil would be little better off—maybe worse—than now because oil prices are far below parity with most other prices and a general advance would freeze that situation.

All of this adds up to: Give PAW and OPA a chance to make good. Let the farm bloc and coal miner issues be settled first. PAW can use additional time to improve the case for a crude advance. On margins, the jobber-retailer questionnaires will leave no room for either PAW or OPA to squirm out of recommending a price advance, even if they were so minded. There will be time enough for political pressure when either PAW or OPA shows signs of stalling. The bandwagon will be rolling faster then. Politicians will be scrambling to get aboard.

Henderson Holdovers Hang On

During the interim also OPA will have time to rid itself of those long-haired economists and college professors whose keenest delight is watching a businessman drown in red ink.

Right now, near the top in OPA, there is a group of Henderson leftovers waging a bitter fight against Prentiss Brown, price administrator, and Clyde Herring, his senior assistant. Ignoring hints to get out, they are sniping at the new OPA leaders. Aiding and abetting these attacks are a few newspapermen, remnants of Leon Henderson's clique, who will never forgive Mr. Brown for being chosen to take their idol's place in OPA.

These holdovers from the Henderson regime are still in places of power where they could hamper the most justifiable price increase proposal, if it suited their purposes.

Hit 'Businessmen' in OPA

Congressional pressure on OPA at this time would play into hands of the Henderson holdovers because their principal criticism of Mr. Brown and Mr. Herring is that they are "politicians" (both are ex-senators). Second point of criticism, equally damaging in the eyes of a Henderson satellite, is that both of the new OPA leaders are businessmen (Mr. Herring is an Iowa independent oil jobber of 20 years' standing).

But politicians are sensitive to public opinion. They respond to the people's will. That's democracy functioning, the American brand of democracy. Without public cooperation, no price control or rationing program can succeed. That's why Mr. Brown gave instructions to draft rationing regulations so they would cause as little irritation to the public as possible. He has profited by Leon Henderson's mistakes.

As for the charge that Brown and Herring are business men—let the people speak on that. Ask the man in the street whether he would rather have practical business men or economists and college professors running OPA.

Half of Motorists Speed Over 35, But Not Many Exceed 40 m.p.h

WASHINGTON — State support of nationwide 35 m.p.h. speed limit has been more effective than any other action in reducing motor vehicle speeds on rural roads, Public Roads Administration announced April 1 in a review of speed studies in a majority of states.

PRA presented the following figures:

Fifty-three percent of all cars still travel over 35 m.p.h.; 91% were exceeding this limit a year ago, however.

Twenty-two percent travel faster than 40 m.p.h., against 78% early last year. Average speed of trucks dropped from 39 m.p.h. early last year to 35 m.p.h. when the limit was established. Buses dropped from 48 m.p.h. to 37 m.p.h. in recent months.

Average passenger car speeds on rural roads reported by states showed: New Mexico 44 m.p.h.; Missouri 43; North Dakota 30; West Virginia 33; New Jersey, Louisiana and South Dakota, 34; Illinois, Vermont, Virginia and Wyoming 35; California, Iowa, Maryland, Massachusetts and Ohio 36; Alabama, Colorado, Georgia, Maine, Michigan, Nevada and Oregon 37; Minnesota and Utah, 39; North Carolina and South Carolina 38; and Arizona and Washington, 40.

The speed studies, PRA said, were made largely by state highway departments at the request of PRA and Highway Traffic Advisory Committee to the War Department.

WAR ORDERS for the OIL INDUSTRY

Every care is taken each week to list every order, rule and regulation issued by any war agency and applicable to all branches of the oil industry. Since these orders are so numerous, however, we will appreciate our readers' cooperation in letting us know when they feel that we have omitted a regulation.

Complete copies of the official text of every order on oil can be obtained from PLATT'S OIL-Law-GRAM, 1213 W. Third St., Cleveland, Ohio, a publication which reproduces and mails out the orders on oil immediately upon issuance. Minimum charge for single copies, $1, postage paid. One year's service, $75.

Code: AO—Administrative order; RO—Ration order; L—Limitation order; M—Conservation order; P—Preference rating order; PS—Price schedule; RPS—Revised price schedule; MPR—Maximum price regulation; GMPR—General maximum price regulation; Supp.—Supplementary; Reg.—Regulation; GO—General order.

The Week's Orders

(Issued from March 27-April 3 inclusive)

PAW—Petroleum Administration for War
- PAO 10—Lubricating grease
- PAO 11—Production (M-68) and SO 1, 2, 3, 4, 5
- Dir. 64—District 2 refining
- Dir. 65—District 2 transportation, distribution

PR—Prices
- 28—Ethyl alcohol, Am. 1
- 63—Tires, retail, Am. 9
- 88—California heavy fuel, Am. 88
  - Dry gas, Am. 88
  - Kerosine, Am. 85
  - Price adjustment, Am. 84
  - Synthetic rubber, Am. 86
- 136—Machines, Am. 72
- 137—Kerosine, Am. 29
- 143—Tires, wholesale, Am. 4
- 323—Asphalt, Am. 1
- GMPR—Sulfuric acid, SR 14
  - Rubber, SR 1, 14

RO—Ration Orders
- 1A—Tires, Am. 20, 21
- 5C—Gasoline, Am. 38, 39
- 11—Fuel oil, Am. 53, 54, 55, 56, 57

L Orders
- L-1-j—Tank trucks
- L-143-a—Rubber processing machinery

M Orders
- M-188—Petroleum sulfonates
- M-255—New steel drums
- M-258—Mineral oil polymers

P Orders
- P-98-b—Supplies

WPB—War Production Board
- CMP 2—Inventory
- CMP 3—Rerating
- PR 11A—Deliveries

FDA—Food Distribution Administration
- FDO 42—Fats and oils

Digest of Week's War-Oil Orders

PAW—Petroleum Administration for War

DISTRICT 2—Dir. 64—Kitty of 40,500 b/d crude to supply refiners in District 2 to be formed; issued 3/12, released 4/1.°

Dir. 65—Zoning regulations set up for District 2 so that deliveries may be made from nearest terminals; issued 3/17, released 4/1.

LUBRICATING GREASE—PAO 10—Use of fatty oils in manufacture of greases further restricted; Rec. 58 revoked; issued 3/27, effective 4/1.

PRODUCTION—PAO 11—Regulations and control over production modified by new order which supplants M-68; issued 3/20, effective 3/31.

SO 1 to PAO 11—General regulations set up for drilling of gas wells in Appalachian Region and parts of Kansas, Oklahoma and Missouri; other wells require specific exceptions; issued 3/30, effective 3/31.

SO 2 to PAO 11—All secondary recovery operations permitted in Pennsylvania and New York, while specific exceptions are required for other areas; drilling regulations set for Pennsylvania, New York and West Virginia; issued 3/30, effective 3/31.

° Not released on date of issuance.

SO 3 to PAO 11—Plug-back operations permitted in Smackover Field; issued 3/30, effective 3/31.

SO 4 to PAO 11—Regulations on California heavy crude (as issued in M-68-3) continued; issued 3/30, effective 3/31.

SO 5 to PAO 11—Regulations on drilling in Illinois, Indiana and Kentucky (as issued in M-68-5 and PAO 2) continued; issued 3/31, effective 4/1.

WPB—War Production Board

CONTROLLED MATERIALS PLAN—PR 11A as amended April 1—Regulations clarified to provide for second quarter deliveries under PRP.

CMP 3, Inter. 1—Up-ratings of orders by applications of allotment numbers relate back to date when original rating was applied, for purposes of delivery; issued 4/2.

INVENTORY—CMP 2, Inventory Direction 3—Petroleum operators subject to provisions of P-98-c instead of CMP 2; issued 3/27.

MINERAL OIL POLYMERS—M-258 as amended March 27—Control granted to PAW.

PETROLEUM SULFONATES—M-188 as amended March 27—Control granted to PAW.

RUBBER PROCESSING — L-143-a — All rubber processing machines and equipment except retreading equipment placed under control of Office of Rubber Director; issued 3/26, effective 4/9.

STEEL DRUMS—M-253 as amended March 29—Application to purchase new steel drums to be made on Form PD-835 instead of by letter.

SUPPLIES—P-98-b as amended April 1—Procedure amended to conform to Controlled Materials Plan.

TANK TRUCKS—L-1-j—Transfer of fluid-food tank trucks, trailers and tank tractors prohibited without authorization of WPB; issued 3/26.°

OPA—Office of Price Administration

ASPHALT—MPR 323, Am. 1—West Coast prices raised $1.40 per ton; issued and effective 3/26.°

DRY GAS—RPS 88, Am. 88—California heavy fuel price increase does not affect dry gas although contracts are based on adjustable prices; issued and effective 4/1.

ETHYL ALCOHOL—MPR 28, Am. 1—Pricing provisions clarified; issued 4/1, effective 2/27.

FUEL OIL PRICES—RPS 88, Am. 88—California heavy fuel increase extended to all levels in District 5; issued and effective 4/1.

FUEL OIL RATIONING—RO 11, Am. 53—Forty percent cut in ration of industrial, commercial and governmental consumers restored after April 1; issued 3/27, effective 4/1.

Am. 54—Procedure simplified by issuance of record cards for surrender of coupons by consumers who are also primary suppliers; issued 3/27, effective 4/2.

Am. 55—Fifth period moved back from April 6 to March 29 for portions of Washington which are in Zone B; issued and effective 3/29.

Am. 56—Used coupon sheets need not be surrendered until application is made for ration for next heating year; issued 4/1, effective 4/6.

Am. 57—Supplemental rations to be granted in Washington, Oregon and Idaho; issued and effective 3/30.

GASOLINE RATIONING—RO 5C, Am. 38—Procedure for replacement of lost, stolen or destroyed ration books made to conform to Procedural Regulation 12; issued 4/2, effective 4/8.

Am. 39—When further rations are issued, current ration will be recalled and new one will be effective immediately; issued 4/2, effective 4/8.

KEROSINE—RPS 88, Am. 85—Hartford, Conn. tank wagon prices increased .2c per gal.; issued 3/30, effective 4/5.

MPR 137, Am. 29—Retail prices in Hartford area raised to 12.7c per gal. to conform to above amendment; issued 3/30, effective 4/5.

MACHINES—MPR 136, Am. 72—Blanket leases of machinery by Defense Plant Corp. exempted from price control; issued 3/27, effective 4/3.

PRICE ADJUSTMENT—RPS 88, Am. 84—Petitions for adjustment under RPS 88 are to be filed according to provisions of Procedural Regulation 1; issued 3/27, effective 4/2.

RUBBER—GMPR, SR 14, Am. 156—Commodities made of crude rubber which are priced under GMPR may be contracted for at higher ceilings, if such ceiling is in effect when deliveries are made; issued and effective 4/2.

GMPR, SR 1, Am. 58—Crude and guayule rubber and liquid latex removed from price control of GMPR; issued 3/30, effective 4/1.

GMPR, SR 1, Am. 57—Hydrocarbon fractions and components used in manufacture of synthetic rubber exempted from price control of GMPR; issued 3/30, effective 4/5.

RPS 88, Am. 86—Hydrocarbon fractions and components used in manufacture of synthetic rubber exempted from price control of RPS 88; issued 3/30, effective 4/5.

SULFURIC ACID—GMPR, SR 14, Am. 143—Adjustable pricing permitted for sulfuric acid sold on long term contracts; issued 3/29, effective 4/3.

TIRE PRICES—MPR 143, Am. 4—Separate maximum wholesale prices set up for factory "second" new tires and tubes for automobiles and trucks; issued 4/2, effective 4/8.

RPS 63, Am. 9—Separate maximum retail prices set up for factory "second" new tires and tubes for automobiles and trucks, conforming to above amendment; issued 4/2, effective 4/8.

TIRE RATIONING—RO 1A, Am. 20—Tire dealers may repossess tires, tubes or camelback transferred under conditional sales contract or chattel mortgage without first getting OPA authorization; issued 3/31, effective 4/6.

Am. 21—Easing of restrictions on acquisition by dealers of farm tires to be effective on April 9 rather than April 15; issued and effective 3/31.

FDA—Food Distribution Administration

FATS AND OILS—FDO 42—Control of fats and oils transferred to Food Distribution Administration; M-71 revoked; issued 3/31, effective 4/1.

Official Text of Important Orders

Petroleum Directive 65

(See maps and story NPN Jan. 27, p. 4)

TITLE 32—NATIONAL DEFENSE

CHAPTER XIII—PETROLEUM ADMINISTRATION FOR WAR

PART 1545—PETROLEUM SUPPLY
PETROLEUM DIRECTIVE 65

The shortage of facilities for the transportation of petroleum has created in certain area shortages in the supply of petroleum and has made it imperative that all such facilities be used with maximum efficiency, that all back hauling, cross hauling, and unnecessary movement of petroleum be eliminated, and the following operating Directive is deemed necessary for the prosecution of the war.

Section 1545.5 Petroleum Directive 65.

(a) Definitions.

(1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

(2) "Original supplier" means any person who, at the date of the issuance of this Directive, refines petroleum in the United States and sells petroleum for delivery in District Two, or who distributes petroleum through a terminal in District Two.

(3) "Petroleum products" means motor fuel, kerosene, range oil, tractor fuel, distillate fuel oils, and residual fuel oils.

(4) "District Two" means the States of Ohio, Kentucky, Tennessee, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma.

(5) "Manager" means the person designated and appointed as such by the General Committee for District Two, to act for and on behalf of the Supply and Distribution Committee of the General Committee for District Two, in accordance with instructions and policies of the General Committee for District Two in connection with the operation and administration of this Directive.

(6) "Terminal" means any storage plant supplied with petroleum products by pipe line or by river barge or lake tanker, as distinguished from bulk distributing stations or refineries.

(b) Surveys and Investigations.

Subject to the supervision of the Director of Pe-

Petroleum Supply, or such District Director as he may designate, the Manager and the Supply and Distribution Committee of the General Committee for District Two shall obtain, analyze, and keep current such pertinent and available facts, figures, and other data with respect to the available supplies of petroleum products and petroleum transportation in, to, and from District Two as may be necessary or appropriate in connection with the performance of the functions and duties with which the Supply and Distribution Committee of the General Committee for District Two is charged hereunder: **Provided,** that whenever available, such facts, figures, and other data shall be obtained from other appropriate committees or subcommittees rather than by new surveys or investigations.

(c) District Two Petroleum Supply Operations.

Subject to the supervision of the Director of Petroleum Supply, or such District Director as he designate, the Manager shall arrange for purchases, sales, exchanges, and loans of petroleum products among, and for the common use of facilities by, original suppliers in District Two only when any such transaction will:

(1) eliminate or shorten the movement of petroleum products by pipe line, lake tanker, barge, tank car, or transport truck facilities within the confines of District Two: **Provided,** that such transaction does not result in a wasteful use of any such transportation facility within or outside of District Two; or

(2) eliminate a movement or movements of petroleum products from District One to District Two; or

(3) eliminate a movement or movements of petroleum products in a generally southerly or westerly direction and substitute therefor a movement or movements in a generally northerly or easterly direction; or

(4) result in a substitution of a pipe line movement, or movements of petroleum products for a movement, or movements, by lake tanker, barge, tank car, or transport truck; or

(5) eliminate any cross hauling or back hauling of petroleum products; or

(6) result in furnishing petroleum products to original suppliers from refineries or terminals within each respective area described in Exhibits "A" and "B" hereof.

(d) Elimination of Unnecessary Movements Within District Two.

In order to balance and coordinate available supplies of petroleum products in District Two with requirements to conserve the use of the transportation facilities, including pipe lines, lake tankers, barges, tank cars, and transport trucks, to increase the movement of petroleum products in a northerly and easterly direction, and to accomplish the other objectives of this Directive, the Manager shall, subject to the supervision of the Director of Petroleum Supply, or such District Director as he may designate, arrange for exchanges, loans, sales, and purchases of petroleum products between and among original suppliers in District Two which will tend to eliminate to the maximum extent practicable the movement of petroleum products, except residual fuel oil, between the areas described in Exhibit "A" hereof, and the movement of residual fuel oil between the areas described in Exhibit "B" hereof. Original suppliers in District Two shall eliminate to the greatest extent practicable inter-area shipments between such areas and shall obtain necessary supplies and dispose of surpluses of petroleum products by means of exchanges, loans, sales, and purchases as provided in the foregoing sentence: **Provided,** that there shall be no tank car shipments of motor fuel, kerosene or distillate fuel oil to meet the requirements of any individual area except as approved by the Manager and the Director of Petroleum Supply, or such District Director as he may designate. Each original supplier in District Two shall file with the Manager on or before Friday of the succeeding week a complete weekly report of all inter-area shipments made by such supplier, together with a statement of the reasons for each such shipment. Nothing herein contained shall be deemed to prohibit or to require the reporting of the shipment from any area into any county adjacent thereto in any adjoining area.

(e) Sales, Loans, and Exchanges.

(1) The terms and conditions of any exchange, loan, sale, or purchase made pursuant to this Directive shall be subject to negotiation between the parties to any such transaction: **Provided,** that no price agreed upon shall exceed any applicable ceiling price established by the Office of Price Administration, and, **Provided, further,** that if the parties to any such transaction are unable to agree upon the price or other terms and conditions for furnishing any of the petroleum required to be sold, exchanged or loaned under this Directive, or for the use of any facilities, any such dispute shall be referred to the Director of Petroleum Supply, or such District Director as he may designate, for such action as he may direct;

(2) all exchanges, loans, sales, and purchases pursuant to this Directive shall be effected in such a manner as to provide to customers, including intermediate suppliers, of original suppliers in each of the areas in equitable share of the supplies of petroleum products available in each such area.

(f) Determination of Requirements.

The Supply and Distribution Committee of the General Committee for District Two, in collaboration with the Refining Committee for District Two, shall analyze and determine the amounts of petroleum products and petroleum transportation facilities available to any area to meet the needs of such area and shall make recommendations to the Director of Refining and the Director of Petroleum Supply with respect to such refinery yields of petroleum products as may be necessary to balance available supplies with requirements without interfering with the maximum production of critical war products.

(g) Movement of Surpluses to District One.

The Supply and Distribution Committee of the General Committee for District Two shall arrange with the appropriate committee for District One and with the Petroleum Administration for War for transportation facilities to move to District One such surpluses of petroleum as may be created in any area of District Two by the operation of this Directive. Such arrangements shall be in accordance with the provisions of Petroleum Directive 59, as Amended (7 F.R. 10621) or as hereafter amended.

(h) Coordination of Product Pipe Lines.

The Supply and Distribution Committee of the General Committee for District Two and all persons affected by such arrangements shall coordinate the movement of petroleum products through product pipe lines in District Two in such manner and as directed by the Petroleum Administration for War, so as to adjust such movements to supply requirements and to minimize the use of lake tanker, barge, tank car, or transport truck facilities.

(i) Administration.

In carrying out the duties, responsibilities, and functions imposed upon him by this Directive, the Manager shall consult with appropriate committees and subcommittees to the extent that activities hereunder may affect such committees and subcommittees. Meetings of the Supply and Distribution Committee of the General Committee for District Two, the Manager, and other persons who may be affected by this Directive, may be held from time to time for the purpose of doing all things necessary to carry into effect the provisions of this Directive. The Supply and Distribution Committee of the General Committee shall maintain such staff and appoint such persons as it finds necessary to carry out its responsibility, duties, and functions under this Directive. Operating expenses of the Committee and the Manager shall be met as provided in Section 1500.7 of this chapter.

(j) Appeals.

Any person affected by this Directive or any action taken hereunder who considers that compliance therewith would work an exceptional and unreasonable hardship upon him may appeal to the District Director in Charge of the Office of Petroleum Administration for War for District Two, setting forth the pertinent facts and reasons why he considers himself entitled to relief, which Director shall act promptly upon such appeal and render a decision thereon within a period of fifteen days. If dissatisfied with the decision of the District Director in Charge, such person may appeal within fifteen days after receipt of notice of the District Director's decision to the Deputy Petroleum Administrator, or such representative as he may designate.

(E.O. 9276, 7 F.R. 10091).

Issued this 17th day of March, 1943.

(Sgd) R. K. DAVIES,
Deputy Petroleum Administrator for War.

EXHIBIT "A"

DISTRICT TWO SUPPLY AND DISTRIBUTION AREAS

MOTOR FUEL, KEROSENE, RANGE OIL, TRACTOR FUEL, DISTILLATE FUEL OILS

Area 1: The entire western part of the State of North Dakota up to and including the Counties of Rolette, Pierce, Wells, Kidder, Logan, and McIntosh; the entire western part of the State of South Dakota up to and including the Counties of Campbell, Walworth, Potter, Sully, Hughes, Lyman, and Tripp; the entire western part of the State of Nebraska up to and including the Counties of Cherry, Thomas, Logan, Lincoln, Frontier, and Redwillow.

Area 2: The Counties of Cheyenne, Rawlins, Decatur, Norton, Phillips, Smith, Sherman, Thomas, Sheridan, Graham, Rooks, Osborne, Wallace, Logan, Gove, Greeley, Wichita, Scott, and Lane of the State of Kansas.

Area 3: The Counties of Hamilton, Kearney, Finney, Stanton, Grant, Haskell, Gray, Ford, Morton, Stevens, Seward, Meade, and Clark of the State of Kansas; the Counties of Cimarron, Texas, Beaver, Harper, Woods, Ellis, and Woodward of the State of Oklahoma.

Area 4: The Counties of Towner, Cavalier, Pembina, Benson, Ramsey, Walsh, Nelson, and Grand Forks of the State of North Dakota; the Counties of Kittson, Roseau, Lake of the Woods, Marshall, Beltrami, Polk, Pennington, Red Lake, Clearwater, Hubbard, Wadena, Cass, Crow Wing, Aitkin, Itasca, Koochiching, Saint Louis, Lake, Cook, Carlton, and Pine of the State of Minnesota; the Counties of Douglas, Bayfield, Ashland, Iron, Vilas, Burnett, Washburn, Sawyer, Rusk, Price, Taylor, Oneida, and Lincoln of the State of Wisconsin; the Counties of Gogebic and Ontonagon of the State of Michigan.

Area 5: The Counties of Eddy, Griggs, Steele, Traill, Foster, Stutsman, Barnes, Cass, La Moure, Ransom, and Richland in the State of North Dakota; the Counties of Norman, Mahnomen, Clay, Becker, Wilkin, Otter Tail, Grant, Douglas, Todd, Morrison, Mille Lacs, Kanabec, Benton, Isanti, Chisago, Stevens, Pope, Stearns, Sherburne, Anoka, Washington, Swift, Kandiyohi, Meeker, Wright, Hennepin, Ramsey, McLeod, Carver, Sibley, Scott, Dakota, Goodhue, LeSueur, Rice, Wabasha, Waseca, Steele, Dodge, Olmsted, Winona, Freeborn, Mower, Fillmore, and Houston in the State of Minnesota; the Counties of Polk, Barron, Saint Croix, Dunn, Chippewa, Pierce, Pepin, Eau Claire, Clark, Buffalo, Trempealeau, Jackson, La Crosse, Monroe, and Vernon in the State of Wisconsin.

Area 6: The Counties of Dickey and Sargent in the State of North Dakota; the Counties of McPherson, Brown, Marshall, Roberts, Edmunds, Day, Grant, Faulk, Spink, Clark, Codington, Deuel, Hamlin, Hyde, Hand, Beadle, Kingsbury, Brookings, Buffalo, Jerauld, Sanborn, Miner, Lake, Moody, Brule, Aurora, Davison, Hanson, Gregory, McCook, Minnehaha, Charles Mix, Douglas, Hutchinson, Turner, and Lincoln in the State of South Dakota; the Counties of Traverse, Big Stone, Lac qui Parle, Chippewa, Yellow Medicine, Renville, Lincoln, Lyon, Redwood, Brown, Blue Earth, Nicollet, Pipestone, Murray, Cottonwood, Watonwan, Rock, Nobles, Jackson, Martin, and Faribault in the State of Minnesota; the Counties of Lyon, Osceola, Dickinson, Emmet, Kossuth, Sioux, O'Brien, Clay, Palo Alto, Pocahontas, and Humboldt in the State of Iowa.

Area 7: The Counties of Bon Homme, Tankton, Clay, and Union in the State of South Dakota; the Counties of Keyapaha, Boyd, Brown, Rock, Holt, Knox, Cedar, Dixon, Dakota, Blaine, Loup, Garfield, Wheeler, Antelope, Pierce, Wayne, Thurston, Madison, Stanton, Cuming, Burt, Custer, Valley, Greeley, Boone, Nance, Sherman, Howard, Platte, Colfax, Dodge, Washington, Dawson, Buffalo, Hall, Merrick, Hamilton, Polk, Butler, Saunders, Douglas, Sarpy, Cass, Otoe, York, Seward, Lancaster, Gosper, Phelps, Kearney, Adams, Clay, Fillmore, Saline, Gage, Furnas, Harlan, Franklin, Webster, Nuckolls, Thayer, and Jefferson in the State of Nebraska; the Counties of Plymouth, Cherokee, Buena Vista, Woodbury, Ida, Sac, Monona, Crawford, Carroll, Harrison, Shelby, Audubon, Pottawattamie, Cass, Adair, Mills, Montgomery, Adams, Union, Fremont, Page, Taylor, and Ringgold in the State of Iowa.

Area 8: The Counties of Jewell, Republic, Washington, Mitchell, Cloud, Clay, Lincoln, Ottawa, Dickinson, Geary, Trego, Ellis, Russell, Ellsworth, Saline, Morris, Ness, Rush, Barton, Rice, McPherson, Marion, Chase, Lyon, Coffey, Franklin, Miami, Anderson, Linn, Hodgeman, Pawnee, Stafford, Reno, Harvey, Butler, Greenwood, Woodson, Allen, Bourbon, Edwards, Pratt, Kiowa, Comanche, Barber, Kingman, Harper, Sedgwick, Sumner, Cowley, Elk, Chautauqua, Wilson, Neosho, Crawford, Montgomery, Labette, and Cherokee in the State of Kansas; the Counties of Nowata, Craig, and Ottawa in the State of Oklahoma; the Counties of Cass, Bates, Vernon, Barton, Jasper, Newton, McDonald, Johnson, Henry, Saint Clair, Cedar, Dade, Lawrence, Barry, Pettis, Benton, Hickory, Polk, Greene, Christian, Stone, and Taney in the State of Missouri.

Area 9: The Counties of Alfalfa, Major, Blaine, Grant, Garfield, Kingfisher, Canadian, Kay, Noble, Logan, Oklahoma, Cleveland, Pottawatomie, Osage, Pawnee, Payne, Lincoln, Creek, Okfuskee, Seminole, Hughes, Washington, Tulsa, Okmulgee, McIntosh, Rogers, Wagoner, Muskogee, Mayes, Delaware, Adair, Cherokee, and Sequoyah in the State of Oklahoma.

Area 10: The Counties of Roger Mills, Beckham, Harmon, Greer, Jackson, Dewey, Custer, Washita, Kiowa, Tillman, Caddo, Comanche, Cotton, Grady, Stephens, Jefferson, McClain, Garvin, Murray, Carter, Love, Pontotoc, Johnston, Marshall, Coal, Atoka, Bryan, Pittsburg, Haskell, Latimer, Pushmataha, Choctaw, LeFlore, and McCurtain in the State of Oklahoma.

Area 11: The Counties of Winnebago, Worth, Mitchell, Howard, Winneshiek, Allamakee, Hancock, Cerro Gordo, Floyd, Chickasaw, Fayette, Clayton, Wright, Franklin, Butler, Bremer, Calhoun, Webster, Hamilton, Hardin, Grundy, Black Hawk, Buchanan, Delaware, Dubuque, Green, Boone, Story, Marshall, Tama, Benton, Linn, Jones, Jackson, Guthrie, Dallas, Polk, Jasper, Poweshiek, Iowa, Johnson, Cedar, Clinton, Scott, Muscatine, Madison, Warren, Marion, Mahaska, Keokuk, Washington, Louisia, Clark, Lucas, Monroe, Wapello, Jefferson, Henry, Des Moines, Decatur, Wayne, Appanoose, Davis, Van Buren, and Lee in the State of Iowa; the Counties of Richland, Crawford, Grant, Iowa, and Lafayette in the State of Wisconsin; the Counties of Jo Daviess, Carroll, Whiteside, Rock Island, Henry, Mercer, Warren, Henderson, and Hancock in the State of Illinois.

Area 12: The Counties of Atchison, Holt, Nodaway, Andrew, Buchanan, Platte, Worth, Gentry, DeKalb, Clinton, Clay, Jackson, Harrison, Daviess, Caldwell, Ray, Lafayette, Mercer, Grundy, Livingston, Carroll, Saline, Putnam, Sullivan, Linn, Chariton, Schuyler, Adair, and Macon in the State of Missouri; the Counties of Marshall, Nemaha, Brown, Doniphan, Riley, Pottawatomie, Jackson, Atchison, Jefferson, Leavenworth, Wyandotte, Shawnee, Wabaunsee, Osage, Douglas, and Johnson in the State of Kansas; the

Counties of Johnson, Pawnee, Nemaha, and Richardson in the State of Nebraska.

Area 13: The Counties of Dallas, Webster, Douglas, Ozark, Laclede, Wright, Pulaski, Texas, Howell, Phelps, Dent, Shannon, Oregon, Crawford, Reynolds, Carter, Ripley, Washington, Iron, Jefferson, Saint Francois, Sainte Genevieve, Madison, Wayne, and Butler in the State of Missouri.

Area 14: The Counties of Forest, Florence, Marinette, Langlade, Oconto, Marathon, Shawano, Wood, Portage, Waupaca, Outagamie, Brown, Kewaunee, Juneau, Adams, Waushara, Winnebago, Calumet, Manitowoc, Marquette, Greenlake, Door, Fond Du Lac, Sheboygan, Sauk, Columbia, Dodge, Washington, Ozaukee, Dane, Jefferson, Waukesha, and Milwaukee in the State of Wisconsin; the Counties of Houghton, Keweenaw, Baraga, Iron, Marquette, Dickinson, Menominee, Alger, Delta, Schoolcraft, Luce, Mackinac, and Chippewa in the State of Michigan.

Area 15: The Counties of Allegan, Barry, Eaton, Van Buren, Kalamazoo, Calhoun, Berrien, Cass, Saint Joseph, and Branch in the State of Michigan; the Counties of Lake, Porter, Newton, Jasper, Benton, Warren, Fountain, Tippecanoe, White, Pulaski, Starke, Laporte, Saint Joseph, Marshall, Fulton, Miami, Cass, Carroll, Clinton, Howard, Tipton, Elkhart, Kosciusko, Wabash, Grant, Lagrange, Noble, Whitley, Huntington, Steuben, DeKalb, Allen, Wells, and Adams in the State of Indiana; the Counties of Stephenson, Ogle, Lee, Bureau, Putnam, Marshall, Winnebago, Boone, DeKalb, LaSalle, Livingston, Ford, McHenry, Cook, Lake, Kane, Du Page, Kendall, Will, Grundy, Kankakee, and Iroquois in the State of Illinois; the Counties of Green, Rock, Walworth, Racine, and Kenosha in the State of Wisconsin.

Area 16: The Counties of Knox, Fulton, McDonough, Schuyler, Adams, Brown, Pike, Calhoun, Jersey, Greene, Scott, Morgan, Cass, Mason, Peoria, Stark, Woodford, McLean, Tazewell, Logan, Menard, Sangamon, Macoupin, Madison, Saint Clair, Monroe, Randolph, Jackson, Williamson, Franklin, Perry, Hamilton, Wayne, Jefferson, Washington, Clinton, Marion, Clay, Effingham, Fayette, Bond, Shelby, Montgomery, Christian, Moultrie, Piatt, Macon, and DeWitt in the State of Illinois; the Counties of Scotland, Knox, Clark, Lewis, Shelby, Marion, Monroe, Ralls, Pike, Randolph, Howard, Boone, Audrain, Callaway, Montgomery, Lincoln, Warren, Saint Charles, Saint Louis, Franklin, Gasconade, Osage, Maries, Cole, Miller, Camden, Morgan, Moniteau, and Cooper in the State of Missouri.

Area 17: The Counties of Champaign, Vermilion, Douglas, Coles, Edgar, Clark, Cumberland, Jasper, Crawford, Lawrence, Richland, Edwards, Wabash, White, Saline, and Gallatin in the State of Illinois; the Counties of Vermilion, Parke, Vigo, Clay, Sullivan, Greene, Knox, Owen, Monroe, Lawrence, Martin, Daviess, Orange, Crawford, Dubois, Pike, Gibson, Posey, Vanderburgh, Warrick, Spencer, and Perry in the State of Indiana; the Counties of Union, Henderson, Webster, McLean, Hopkins, Muhlenberg, Butler, Warren, Edmonson, Grayson, Ohio, Daviess, Hancock, Breckenridge, and Mead in the State of Kentucky.

Area 18: The Counties of Union, Johnson, Pope, Hardin, Alexander, Pulaski, and Massac in the State of Illinois; the Counties of Perry, Bollinger, Cape Girardeau, Scott, Stoddard, New Madrid, Mississippi, Dunklin, and Pemiscot in the State of Missouri; the Counties of Hickman, Carlisle, Ballard, McCracken, Fulton, Graves, Marshall, Calloway, Trigg, Lyon, Caldwell, Crittenden, and Livingston in the State of Kentucky; the Counties of Lake, Obion, Weakley, Henry, Carroll, Gibson, Dyer, Crockett, Lauderdale, Tipton, Haywood, Madison, Henderson, Shelby, Fayette, Hardeman, Chester, and McNairy in the State of Tennessee.

Area 19: The Counties of Emmet, Charlevoix, Cheboygan, Presque Isle, Alpena, Montmorency, Otsego, Antrim, Leelanau, Benzie, Grand Traverse, Kalkaska, Crawford, Oscoda, Alcona, Manistee, Wexford, Missaukee, Roscommon, Ogemaw, Iosco, Mason, Lake, Osceola, Clare, Arenac, Gladwin, Bay, Huron, Tuscole, Sanilac, Saginaw, Gratiot, Midland, Isabella, Mecosta, Montcalm, Newaygo, Oceana, Muskegon, Ottawa, Kent, Ionia, Clinton, Shiawassee, Genesee, Lapeer, and Saint Clair in the State of Michigan.

Area 21: The Counties of Jackson, Jennings, Ripley, Jefferson, Scott, Clark, Floyd, Harrison, and Washington in the State of Indiana; the Counties of Carroll, Trimble, Oldham, Henry, Owen, Scott, Harrison, Robertson, Bracken, Mason, Nicholas, Montgomery, Bourbon, Fayette, Franklin, Shelby, Jefferson, Bullitt, Spencer, Anderson, Woodford, Jessamine, Garrard, Boyle, Mercer, Bath, Washington, Nelson, Hardin, LaRue, Hart, Warren, Monroe, Metcalf, Green, Taylor, Marion, Adair, Cumberland, Clinton, Wayne, Russell, Pulaski, Casey, Lincoln, Rock Castle, Laurel, Clay, Jackson, Madison, Clark, Estill, Powell, Menifee, Wolfe, Lee, Breathitt, Owsley, Perry, Knott, Letcher, and Leslie in the State of Kentucky.

Area 22: The Counties of Christian, Todd, Logan, Simpson, Allen, McCreary, Whitley, Knox, Bell, and Harlan in the State of Kentucky; the Counties of Stewart, Houston, Benton, Humphreys, Decatur, Perry, Hardin, Wayne, Lawrence, Giles, Maury, Lewis, Hickman, Williamson, Dickson, Montgomery, Robertson, Cheatham, Davidson, Sumner, Macon, Trousdale, Wilson, Rutherford, Bedford, Marshall, Lincoln, Moore, Franklin, Coffee, Cannon, DeKalb, Smith, Jackson, Clay, Pickett, Putnam, Overton, White, Warren, Grundy, Marion, Van Buren, Bledsoe, Sequatchie, Hamilton, Bradley, Polk, McMinn, Monroe, Meigs, Rhea, Cumberland, Fentress, Scott, Morgan, Campbell, Anderson, Roane, Loudon, Blount, Sevier, Jefferson, Knox, Union, Claiborne, Hancock, Grainger, Hamblen, Hawkins, Cocke, Greene, Sullivan, Washington, Unicoi, Carter, and Johnson in the State of Tennessee.

Area 23: The Counties of Ingham, Livingston, Oakland, Macomb, Jackson, Washtenaw, Wayne, Hillsdale, Lenawee, and Monroe in the State of Michigan; the Counties of Williams, Defiance, Paulding, Van Wert, Mercer, Fulton, Henry, Putnam, Allen, Auglaize, Shelby, Lucas, Wood, Hancock, Hardin, Logan, Ottawa, Sandusky, Seneca, Wyandot, Marion, Union, Erie, Huron, Crawford, and Richland in the State of Ohio.

Area 24: The Counties of Darke, Preble, Butler, Hamilton, Clermont, Warren, Montgomery, Miami, Champaign, Clark, Greene, Clinton, Brown, Highland, Fayette, and Madison in the State of Ohio; the Counties of Boone, Kenton, Campbell, Pendleton, Grant, and Gallatin in the State of Kentucky; the Counties of Union, Franklin, Dearborn, Ohio, and Switzerland in the State of Indiana.

Area 25: The Counties of Lewis, Fleming, Rowan, Morgan, Magoffin, Floyd, Pike, Martin, Johnson, Lawrence, Elliott, Carter, Boyd, and Greenup in the State of Kentucky; the Counties of Morrow, Delaware, Knox, Franklin, Pickaway, Ross, Pike, Adams, Scioto, Lawrence, Gallia, Jackson, Meigs, Vinton, Athens, Hocking, Fairfield, Perry, Licking, Holmes, Coshocton, Muskingum, Morgan, Washington, Noble, Monroe, Belmont, Guernsey, Tuscarawas, Carroll, Harrison, and Jefferson in the State of Ohio.

Area 26: The Counties of Lorain, Cuyahoga, Lake, Ashtabula, Ashland, Medina, Wayne, Stark, Columbiana, Summit, Portage, Mahoning, Trumbull, and Geauga in the State of Ohio.

EXHIBIT "B"

District Two Supply and Dsitribution Area
Residual Fuel Oils

Area 1: The States of Oklahoma and Kansas; all of the State of Missouri except the counties of Saint Louis, Saint Charles, and Jefferson; the entire western part of the State of Iowa up to and including the counties of Howard, Chickasaw, Bremer, Blackhawk, Benton, Iowa, Keokuk, Wapello, and Davis; the entire eastern part of the State of Nebraska up to and including the counties of Cedar, Pierce, Madison, Platte, Polk, York, Fillmore, and Thayer.

Area 2: The States of North Dakota and South Dakota; that part of the State of Nebraska not included in Area 1; the entire western part of the State of Minnesota up to and including the counties of Koochiching, Itasca, Aitkin, Kanabec, Millelacs, Benton, Stearns, Kandiyohi, Renville, Brown, Blue Earth, Waseca, Steele, and Freeborn.

Area 3: That part of the State of Minnesota not included in Areas 2 and 4; that part of the State of Iowa not included in Area 1; the Counties of Saint Charles, Saint Louis, and Jefferson of the State of Missouri; the entire western part of the State of Wisconsin up to and including the counties of Iron, Vilas, Oneida, Langlade, Marathon, Portage, Waushara, Greenlake, Columbia, Dane, Jefferson, and Rock, except the counties of Douglas and Bayfield; the entire western part of the State of Illinois up to and including the counties of Stephenson, Ogle, Lee, LaSalle, Livingston, McLean, Logan, Sangamon, Montgomery, Bond, Clinton, Washington, and Monroe; the counties of Gogebic and Ontonagon of the State of Michigan.

Area 4: The counties of Saint Louis, Lake, Cook, Carlton, and Pine of the State of Minnesota; the counties of Douglas and Bayfield in the northwestern part of the State of Wisconsin; the counties of Waukesha, Milwaukee, Walworth, Racine, and Kenosha in the southeastern part of the State of Wisconsin; the counties of Winnebago, Boone, McHenry, Lake, DeKalb, Kane, Cook, Kendall, Grundy, DuPage, Will, and Kankakee of the State of Illinois; and the counties of Lake, Porter, LaPorte, and Saint Joseph of the State of Indiana.

Area 5: That part of the State of Indiana not included in Area 4 except the counties of Posey, Vanderburgh, Warrick, Spencer, Dubois, Perry, Crawford, Grange, Washington, Harrison, Floyd, Scott, Clark, Jefferson, Jennings, Ripley, Franklin, Dearborn, Ohio, and Switzerland; the southeastern part of the State of Illinois up to and including the counties of Iroquois, Ford, Champaign, DeWitt, Macon, Christian, Shelby, Fayette, Marion, Jefferson, Perry, and Randolph.

Area 6: The State of Tennessee; the southern part of the State of Kentucky up to and including the counties of Webster, McLean, Ohio, Grayson, Hart, Larue, Marion, Washington, Mercer, Garrard, Madison, Jackson, Lee, Wolfe, Breathitt, Magoffin, Floyd, and Pike.

Area 7: That part of the State of Wisconsin not included in Areas 3 and 4; the northern peninsula of the State of Michigan except for the counties of Gogebic and Ontonagon, and the western part of the State of Michigan up to and including the counties of Emmet, Charlevoix, Antrim, Kalkaska, Missaukee, Osceola, Newaygo, Kent, Barry, Eaton, Calhoun, and Branch.

Area 8: All that part of the State of Michigan not included in Area 7.

Area 9: All that part of the State of Kentucky not included in Area 6; the southern part of the State of Indiana not included in Areas 4 and 5, the southern part of the State of Ohio up to and including the counties of Preble, Montgomery, Greene, Fayette, Pickaway, Fairfield, Perry, Morgan, Noble, Belmont, and Jefferson.

Area 10: All that part of the State of Ohio not included in Area 9.

OPA Removes 'Bugs' from Order Increasing California Crude

NPN News Bureau

WASHINGTON—On March 26, OPA issued Amendment 87 to RPS 88 authorizing an increase of 25c per bbl. in California heavy crudes and residual fuel oils, but a few "bugs" developed in the order and on April 1, OPA issued Amendment 88 to the schedule to set things right.

In the meantime, however, most California oil companies had not advanced either crude or residual prices, pending clarification of Amendment 87 by OPA, according to reports here. During the interim, buyers knowing that a price advance was coming, were deluging sellers with orders.

Through "inadvertance", OPA said in its Statement of Considerations to Amendment 88, maximum prices of refiners and resellers of the oils were not increased either in California or in the rest of PAW District 5 which includes not only California but Washington, Oregon, Nevada and Arizona, when Amendment 87 was issued.

Amendment 88 states that the maximum price of all resellers at a particular shipping or delivery point in District 5 shall be increased 25c per bbl. for these oils.

OPA, in its press release on Amendment 88, said:

"All sellers of residual fuel oils in District No. 5 other than those granted a similar increase March 26, 1943, today were authorized by OPA to increase their maximum prices 25c per barrel."

Further on, OPA said Amendment 88 "broadened" the increases to include all sellers of these oils in the five states of District 5.

In the same Amendment—No. 88—OPA specified that these increases in residual fuel oils, as well as those granted in Amendment 87 of March 26, cannot be used as the basis for an increase in the price of dry gas in that area.

In the past, OPA said, it has been customary for the industry to write contracts for the sale of dry gas at prices bearing a specified relationship to, and fluctuating with, the prices of residual fuel oils. Action on this point was taken, OPA said, because the reasons for granting the increases in maximum prices of fuel oil are not applicable to dry gas.

Extension of 0.3c Fuel Oil Hike Allowed in 20 Idaho Counties

NPN News Bureau

WASHINGTON—The 0.3c per gal. hike in maximum tank wagon prices for fuel and heating oils granted at the tank wagon level in the rationed states last December by Amendment 53 to RPS 88 was extended April 3 by OPA to the 20 western counties in Idaho which have been brought under fuel oil rationing.

In addition, OPA ruled that the 0.3c advance authorized to cover higher tank wagon costs under rationing applies "to all deliveries of fuel

and heating oils in containers totaling when delivered in single lots 260 gallons or less".

OPA's action was contained in Amendment No. 89 to RPS 88 and Amendment No. 31 to MPR 137—Petroleum Products Sold at Retail —both effective April 2.

P-98-b Reissued To Conform With CMP Regulations

NPN News Bureau

WASHINGTON — P-98-b was reissued April 1 to dovetail into the Controlled Materials Plan.

New order assigned allotment numbers required under CMP for oil industry maintenance, repair and operating supplies. No rating or allotment number issued by the order may be used unless operator participates in material redistribution program No. 2 which has yet to be announced.

AA-1 rating and allotment symbol MRO-P-98-b may be used if PAW Washington office or Canadian oil controller approves orders for any items costing $500 or more, if PAW district office or Canadian oil controller approves order of total cost of $1000 or more in which no single item costs $500 or more, and if copy of delivery order is filed with PAW district office or Canadian oil controller, for information only, when order is for less than $1000 but more than $100; no single item costing $500 or more.

Emergency ratings in case of breakdowns will be granted by PAW here by telephone, telegram or letter.

Orders placed with suppliers should show allotment symbol and preference rating. Any delivery order carrying a rating and authorized as well as certified under the order shall bear a symbol P-98-b and have the same status as an order bearing an allotment symbol and preference rating under CMP Regulation No. 3.

OPA Sets Ceilings for Hartford On Kerosine, Range, Fuel Oil

NPN News Bureau

WASHINGTON — Maximum prices for kerosine, range oil and No. 1 fuel oil in Hartford, Conn., area were set Mar. 30 as follows, with issuance of Amendment 85 to RPS 88, effective April 5:

	Cents Per Gal.
FOB terminals in bulk lots for delivery by tank car or motor transport	7.7
At seller's yard for delivery into buyer's tank wagons	8.0
At seller's yard for deliveries in containers in quantities of 10 gal. or less	10.5
Tank wagon deliveries to resellers	10.2
Tank wagon deliveries to consumers in quantities of 25 gal. or over	10.2
Tank wagon deliveries to consumers in quantities of less than 25 gal.	11.7

These maximum prices do *not* include the 0.3c per gal. increase at the tank wagon level granted by OPA in Amendment 53 to RPS 88.

PAO No. 2 on Drilling Reissued

NPN News Bureau

WASHINGTON—PAO No. 2, relating to drilling in Illinois and part of Indiana and Kentucky, was reissued April 1 by Supplementary Order No. 5 under PAO 11. Order is effective April 1; remains in effect indefinitely.

Hydrocarbons for Rubber Making Freed from Price Controls

NPN News Bureau

WASHINGTON — Office of Price Administration March 30 exempted from RPS 88 price controls on all hydrocarbons and petroleum fractions sold or delivered for use in the manufacture of components of synthetic rubber, and eliminated requirements of the schedule on filling information on sales of aviation gasoline of 87 octane or higher, synthetic rubber and their constituents. Action was taken in Amendment 86 to RPS 88, effective April 5.

Simultaneously, OPA issued Amendment No. 57 to Supplementary Regulation No. 1 to the general maximum price regulation exempting from its price control provisions hydrocarbons sold for use in the manufacture of synthetic rubber.

While most of the materials had been removed from price control by previous amendments, some inadvertently, OPA said, had been left under the regulations.

OPA Amends Rubber Price Rules

NPN News Bureau

WASHINGTON — Office of Price Administration Mar. 30 removed crude rubber, guayule rubber, and liquid latex from control under General Maximum Price Regulation with issuance of Amendment 58 to Supplementary Regulation 1 to GMPR, effective April 1. Action was taken, OPA said, because prices have been established in an agreement between Rubber Reserve Co. (sole seller of the raw materials), Office of Rubber Director, and OPA.

New prices for the raw rubber were announced by OPA on Mar. 9. They were made effective April 1 for both crude and synthetic rubber and are based on a price of 40c per lb. for ribbed smoked sheets of crude rubber. Rubber Reserve Co., OPA said, will, however, continue to sell rubber for manufacture of civilian products on basis of present price of 22.5c per lb.

Gives Extra Fuel Rations in West

NPN News Bureau

WASHINGTON — OPA on April 1 in Amendment 57 to RO 11 on fuel oil rationing regulations, effective Mar. 30, granted supplemental rations in cases of undue hardship in Areas A and B—Washington, Oregon and the 20 rationed counties of Idaho.

Oil Restrictions Still Necessary In Washington-Oregon—PAW

NPN News Bureau

WASHINGTON—PAW Ickes April 1 said continued restrictions upon petroleum consumption in Washington and Oregon are necessary because of "military demands, plus uncertain tanker shipments".

Statement was prompted, PAW said, because of reports that some fuel oil dealers in the 2 states were urging relaxation restrictions of consumers.

Such relaxations, Mr. Ickes said, could not be authorized at this time.

Commenting, PAW Deputy Davies said:

"While it is true that a few dealers may have a large fuel oil supply on hand, there is no basis for assuming that such a condition will continue.

"The Pacific Northwest is practically 100% dependent upon tankers which haul fuel oil from California. At any time, war demands may force the diversion of these tankers to other uses. When and if this is done, fuel oil supplies in Washington and Oregon will be rapidly depleted."

Mr. Davies said PAW was not now urging conversions to other fuels in the 2 states because of current difficulties to acquire coal and wood in the area.

War Department Establishes New Petroleum Branch

NPN News Bureau

WASHINGTON—The Department has set up a new petroleum branch operating under the Procurement Division, Office of the Quartermaster General, with Col. H. E. Rounds as chief. The executive officer is Major Wiley H. Butler.

In official terminology, here is the "mission" of the new unit:

"Determines the requirements, reviews specifications, distributes, directs storage, plans procurements, issues procurement directives, expedites, supervises inspection and where possible salvages, reclaims and conserves all petroleum products, containers and drums used by Army Ground Forces (including marine amphibious equipment) and Army Air Forces (excluding airplanes and other aircraft equipment) used in internal-combustion motors and equipment powered by them, plus those used for combustion, lubrication, power, heating, cooking, lighting, cleaning, generating, decontamination, and special items of Chemical Warfare Service such as fog oil and flame-thrower oil. (Excluded are petroleum products and derivatives used as basic ingredients and components of tires or other manufacturing processes.) Maintain liaison with other Services, Army-Navy Petroleum Board and Aviation Petroleum Allocation Committee."

The men working with Col. Rounds, are:

Major George H. Schoenbaum, chief, Special Assignment Section; Irvin A. Ebaugh, chief, Technical Standards Section; Rudolph J. Baber, chief, Requirements Section; Capt. Sidney G. Harris, chief, Distribution and Planning Section; Major David G. Drobnis, chief, Inspection Section and Major Tiffany B. Williams, chief, Purchase and Expediting Section.

Extend Kerosine Extra Cost Payment

NPN News Bureau

WASHINGTON—RFC Chairman Jones announced Mar. 25 that Defense Supplies Corp., RFC subsidiary, would continue for 3 months from April 1 to absorb extraordinary costs in shipping kerosine into North Atlantic states in steel drums in box cars.

Authorizations heretofore issued to oil companies for shipment of kerosine in drums, Mr. Jones said, have contained condition that shipments must be made prior to April 1 in order to obtain compensation for extraordinary costs from DSC. Authorizations now outstanding will be extended to include shipments made prior to July 1.

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and Publisher, Penton Building, Cleveland, O.

Democracy Calls for Democratic Committees, Says The Editor to Fuel Rationer Dean

HOW all fuel oil men in the oil industry could participate in the formulation of fuel oil rationing regulations and how this universal cooperative effort would help insure not only universal acceptance but universal enforcement of those regulations, was presented to Dr. Joel Dean, director of the fuel rationing division of OPA, the other week.

The recommendation was made by the writer of this page at the request of Dr. Dean himself.

In reply Dr. Dean said he was "going to follow a number of suggestions".

We hope he does for we think the recommendation reaches to the heart of so much of the trouble at Washington, and that is industry and the public are not allowed to have much, or enough, to do with the preparation of the regulations that seek to interfere with their private lives. The New Dealers want to do everything FOR THEM rather than let the American people do things for themselves, even though it is on this latter principle that democracy rests.

The New Dealers say, as Dr. Dean said to the writer the other week, that such procedure with large committees is not efficient. That depends, of course, on what one calls "efficiency" in this regard. If "efficiency" in governing a people means time and conversation saving, then a dictator has it all over any other form of government. But if "efficiency" in government is considered in the light of what we in this country have long considered the best government to be sought, then this "efficiency" must be measured in the terms of the most freedom for the individual, the most enlightenment for him, and the most that builds his mind and Spirit. Such "efficiency", according to history, comes from the individual governing himself.

To Dr. Dean's objection to a large committee of oil men, representing all proper and interested associations that would develop fuel oil regulations, we admitted that such a committee would consume much time and energy but that when that committee was finished there would be rules which the committee and those whom it represents would accept and enforce because, in the main, they would be fair and reasonable rules.

We cited Congress and particularly the House of Representatives — far larger than all committees ever created and yet. The freedom of this country today, the freedom of these very business and oil men, and of the American people, we said, was being saved to them by this unwieldly and seemingly time-wasting House. This was true, we said, because the House fairly represents the people and because its members are close to the people.

HERE is a brief summary of the recommendations we made to Dr. Dean, and they could well be seriously considered by others at Washington and by various rulers of industry committees.

"1. That every representative, well established and interested oil association should be represented on all committees having to do with the drafting, interpretation and application of any fuel oil rationing plan. That every association should be thus represented regardless of how large the main committee might be as it would be a simple matter to break the committee up into working subcommittees if necessary.

"2. That the representative of each association on this central committee should be nominated by the associations and not by OPA or any other outside party.

"3. That these meetings should be open at all times to all members of the oil industry, oil burner industry, construction industry, and so on, and to the trade press of those industries, and that each member of the committee, and all others who may attend, should be free at all times to tell what goes on in the committee meetings, to whomever they wish and the trade press be entirely free to use its own judgment as to what is printed and the manner and time of its presentation. Of course, only members of the committee would speak during committee meetings unless others were invited by the committee to do so.

"4. That the whole problem of fuel oil supply be presented to this committee without any strings, for it to take such action as it sees fit.

"5. That individual committee members be urged, and it be made easily possible, for them to consult freely and fully with their association members and all other interested parties in their areas. That is, should the committee so desire, OPA would supply the member associations or mail direct to their members, whatever material, plans, letters, and so on, the committee wished, for the advice and co-operation of all in the oil industry.

"6. That, while I suppose OPA could not agree to be bound by the committee's recommendations, nevertheless I would earnestly urge that in the event that OPA did not adopt the committee's recommendations in toto, that OPA make a very earnest effort to meet the committee's wishes because OPA cannot hope to make a success of any regulations it may seek to impose upon consumers and the oil industry without the hearty and enthusiastic support of both. If the oil industry or the consumers cannot be convinced of the fairness of the regulations, they will appeal to Congress, to their State Legislatures, or they will just plainly rebel as they have this past winter. Anyway, it would seem that any plan that the committee finally agreed to, should be accepted by OPA because certainly OPA could not get together a more representative group of people than would be represented on and by this committee.

"I again assure you of my earnest desire to co-operate with you and OPA in bringing about the best thought of the entire oil industry and associated industries on this subject.

"Of course, all this should be in conformance with the wishes and authority of the Petroleum Administrator for War."

How The Older Oil Men Are Paying

THE price that men pay in serving their country on the "industrial front" at home is again emphasized by another executive being called from that battle front. This time, fortunately, the call was issued only by his doctors and not by the Supreme Being as has been the case only too often.

That executive is Frank Phillips, creator and chairman of the Phillips Petroleum Co., who presented his resignation as chairman of the general committee for District 2 (Mid-West) to PAW Ickes last week. He said this action followed a month's medical check-up.

Few physiques indeed could build from scratch a big company such as Phillips Petroleum, have it pioneer so many new ideas as has Phillips Petroleum, and then withstand the continual drain from great activity on industry committees and not show signs of wear at 68 years, which we believe is Mr. Phillips' present age.

But in addition to the ordinary strain of building such a new business are the present strains due to war, involving large

doubts as to the future, both political and economic. We hear much these days about the hardship (?) of working a 48-hour week and social workers worry over the strain of a 72-hour week. But our political philosophers say nothing about the business man who is working all the time, whether at his desk or not, working and planning that there will be hours to work and money to pay the workers.

The strain of the last depression took a heavy toll of business executives. In oil, we saw many men "crack up", especially in the days of the late oil code. Half a dozen names quickly come to mind of men whose lives were unquestionably shortened by years due to their work on the oil code at Washington. Others, we know, have not been in good health since. And today's war strain was undoubtedly responsible for the sudden end recently of another big oil man.

But the hazard to life is not just with the big executives. All through oil and all industry the older men are doing a longer day's work than in years, are doing heavier work, physical as well as mental. Men who ordinarily would have retired by now, or be working but 4 or 5 hours a day and that at work not too arduous, are back in their offices for long hours, are doing their own selling, bookkeeping, even typing, or are back in the warehouses or at service stations or on their trucks, rendering the service that the whole petroleum industry is today called upon to give — a service vital to both the military and civilian operations.

So Frank Phillips and his withdrawal from that committee chairmanship where he has served since the start of the war is but a symbol of the older men of the oil industry. Let us hope that all these older men are listening to their doctors and heeding their advice, in order that they may temper their patriotic endeavors to the long time needs of their families, their businesses, the oil industry and their country.

And, we all trust that Frank Phillips will also give due heed to his doctors that he may soon return to industry activity.

Ontario Premier Moves To Boost U. S. Tourists' 'Gas' Ration

Special to NPN

TORONTO — Premier Gordon Conant of Ontario told the fish and game committee of the Ontario legislature that he is going to make strong representations to the oil controller at Ottawa to have the allowance of gasoline to U. S. tourists visiting Canada stepped up materially from the present annual allowance of 12 gal.

He said Canadian tourists visiting the U. S. were given "A" books. If Ontario could get half the amount for U. S. tourists, it would increase travel by 25% to 50%. The present 12-gal. allotment was too small, he said, to permit tourists to get to and from fishing and hunting areas in Canada. The committee passed a resolution asking the oil controller to allow at least 75 gal. a year.

LETTERS FROM NPN READERS

Hon. Prentiss M. Brown
Office of Price Administration
Room 4130—Census Building
Washington, D. C.

My Dear Sir:

Out of the confusion of gasoline rationing, fuel oil rationing, etc., it is apparent that we should now start to reduce some of the red tape and lost manpower due to local Rationing Board rules and regulations.

1st — Why is it necessary for a local manager to appear before the Rationing Board at a specific time to state reasons why each individual fuel oil customer failed to redeem the coupon notes? Due to manpower shortage, our managers are running truck deliveries to farmers and it is impossible for him to appear a certain date and time.

2nd — Why is it necessary to make two trips to a Rationing Board to receive an exchange certificate? The Local Boards ask you to leave the coupons until they count them. Are we not trusted to give certificate upon presentation, and if any error is made they can rectify same on next trip. They have power to refuse us future certificates if we owe them any coupons. The present method means two trips to Rationing Board.

3rd — In turning in coupons, we are obligated to put same in envelope and only 500 coupons to an envelope. Gasoline coupons are of twelve types; fuel oil coupons, eight types. Who should furnish the envelopes necessary to put 500 coupons of each denomination in separate envelopes?

4th — Why should we be asked to separate the Fuel Oil Coupons Notes into individual Rationing Board Areas and collect the amount due from each area. We operate in some areas in six different Rationing Board Zones and have turned in all coupon notes to our District Board. They refuse to accept same, and will take only coupon notes in their area. The Local Board is just as capable and more thoroughly equipped to handle this than we are. After all, it is no fault of any Petroleum Distributor that coupons were not available till late November and December.

5th — With the present manpower problem, our managers are now driving trucks and have all they can do to keep up the necessary book work. Office help is hard to get at the price we can afford to pay. Price ceilings and restrictions govern every commodity we handle and are inadequate to meet the present wage of cost plus 10% industry.

6th — We appeal to you to instruct the local Boards to clean up this coupon note Fuel Oil Rationing at once and to furnish envelopes in which to put the required amount therein. These should be cheaper than gummed labels. Also furnish proper envelopes for gasoline coupons deposited in banks.

Respectfully yours
EDMUND J. RUH
District Mgr.
Petroleum Service
2828 N. Calvert Street
Baltimore, Md.
Maryland & Delaware

* * *

Editor, NPN:

First: May I say that your editorial of March 10th issue of N.P.N. really did something to arouse my ire. As you will notice from this letter head, we are both independent and open all the time. We have no affiliations or allegiance with any major oil company or their products.

In your issue of March 24th (N.P.N.), I notice that the National Council of Independent Petroleum Assns. are asking for a survey of reactions to the Petroleum Administrative Order No. 4; and as to alternate proposals in handling gasoline sales.

Very few service stations that usually closed before this order, have changed to staying open more hours; BUT, the fellow who has always kept a 24-hour truck station or plant, and cannot close due to the nature of his business, is in one helluva fix. Lights, heat, salaries, taxes, insurance etc. are things that just don't stop; because he cannot close his doors to his trade, due to the fact that he has always taken care of this type of business at all hours.

Frankly, the order is not saving man power; what with defense swing-shift workers and the army people travelling at all hours, it is only a headache, not to mention the inconvenience caused those who must travel through states night and day on business of vital importance to the war-effort. Also gov't. purchasing agents and salesmen whose business is 75% or more with Uncle Sam.

My opinion — and it is only a humble personal one — is to revoke the order for any stations that were open 24 hours daily prior to this crazy man power saving idea or order. The balance of the places were never really hurt by the order, so why bother with the detail of staggering hours or certain days of closing or confusing the issue. They are already ahead of the game for the cutting down of hours. The truck stations will never make their salaries alone on just truck service the remaining ninety-six hours per week unless they have some type of relief immediately.

There will always have to be 24 hour stations to take care of truckers and through travellers, so why make them waste their time by a force order that practically eliminates these stations from business.

The PAW, and of course the O.P.A. surely realize that the control of volume of gasoline sold is very limited by the rubber situation and this is accordingly controlled by the local ration boards; so why should a customer of any kind be inconvenienced as to when he can buy his already controlled and limited supply?

We have nothing to say about the chiselers, black-marketeers, or other types of individuals that give our industry a black eye at this time. They are being dealt with in the proper manner. An honest business man, who has always had a 24 hour station, is still not cutting into a man who can go home after locking up his station. Yet, there is not one 24 hour station in the state of Arizona that ever employed (as station attendant) more than one man during the graveyard shift from 12 midnight to 6 or 7 a.m. . . . . and certainly this 72 hour week is not helping save man-power because it takes one man to hold down the station whether he sells to one customer or a hundred. The only possible man-power saved is where the business is closed up . . . . . and is this closing out the small business man saving man-power????? If this order continues, I expect to see our wonderful wizards of Washington, D. C. running up and down the highways at night refueling trucks loaded with vital products. Perhaps they might have figured that out in the first place.

To this date, although I'm too busy to more than glance over the high points in your magazine . . . . . I have never seen just where any penalties or fines have been set up for violation of the seventy-two hour law on gasoline sales to A, B, and C card holders . . . . . Well; the NRA was most unconstitutional and certainly worked hand in hand with disestablishmentarianists;;;; this order is even worse than unconstitutional, it's a criminal outrage and a restriction on trade; to say nothing of an insult to a business man's intelligence. Why not throw the druggist, grocery, ice man, milk man, farmer, and restaurant operator into the same cell together along with the petroleum marketeer, and forget about servicing or serving those that need or might need these things at night as well as day.

May we hear from you soon as to why the MUST'S of all this order, and especially as to why the government has not touched other forms of business to save man power. After all oil is ammunition and is recognized as is one of the most vital links in transportation, farming, not to mention the mechanization of modern warfare.

SINCERELY YOURS,
(s) FRANK M. WILKINSON
Supreme Oil Company
Phoenix, Arizona

* * *

Editor, NPN:

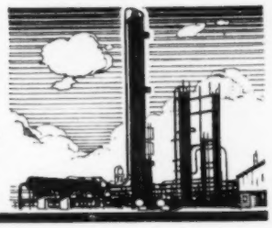
We have been very much disappointed in NPN's attitude on the 72-hour week order.

First of all, practically no information has appeared in National Petroleum News concerning the effect of this order, and secondly, there has been no comment at all in NPN on the widespread industry dissatisfaction with the order.

In the case of our own company, this order has had a very bad effect. The major companies have, of course, many more stations located on a given artery of traffic than any independent. The result is that the major companies are staggering the hours of operations of their company stations, and are able to "blanket" the operations of the independent.

We believe this order has given a big edge to the larger majors. Surely it would be worth NPN's time to investigate the effect of the 72-hour week on the independent stations and then to voice the widespread dissatisfaction with this order.

(S) B. M. MARKSTEIN, JR.
The Crest Oil Co.,
Cincinnati, Ohio



Refiners' 'Kitty'

PAW Allocates 40,500 b/d of Crude To Help Mid-West Refineries Operate at Maximum Efficiency. Intent of Order Is To Help 'Lil Feller, Davies Says

NPN News Bureau

WASHINGTON — Allocation of about 40,500 b/d of crude oil "in a manner designed to effect maximum efficient operation" of midwestern refiners producing war and essential civilian products was ordered April 3 by Petroleum Administration for War in Directive 64.

The directive calls for setting aside about that amount of crude each day from District 2 production for direct allocation to such specific refineries as may be designated, PAW said. The amount totals about 4% of the crude produced in those states, PAW estimated.

The "kitty" will work this way, PAW explained:

Refineries in District 2 will be designated to which this crude will be allocated. The designations will be based upon the refiner's capacity for producing war products, the supply of crude from other sources available to the refiner and the efficient use of transportation facilities.

All companies in District 2 which ran 2000 b/d or more of crude from producing leases in the designated area during December, 1942, will be called upon, as far as practicable, for their pro-rata share of the 40,500 b/d. Variations from the exact pro-rata share of each company, PAW said, will be based on consideration of the effect of the contribution upon the company's capacity for production of war products, supply of crude available to such company and efficient use of transportation facilities.

Davies Comments

Commenting, Deputy PAW Davies said:

"The crude situation in District 2 is getting somewhat tight. Under wartime conditions and controls, this situation tends to affect the small independent refiner more adversely than the larger units. By this directive, we are trying to offset this, although there can obviously be no guarantee that every refiner will get all the crude he wants.

"Our intent is that, so long as the small independent refiner renders just as efficient service to the war program and uses transportation facilities just as efficiently as his larger competitors, we will do what we can to see that he gets his fair share of the available crude supply."

Weil Predicts 10-15c Buna S Rubber in Future

Special to NPN

PITTSBURGH—This city will be in the forefront in producing materials for the synthetic rubber program, B. H. Weil of the Information Section, Chemistry Division, Gulf Research & Development Co., told the Pittsburgh Section of the Society of Automotive Engineers in a recent talk. Few if any regions will produce a greater combined tonnage of materials for synthetic rubber, he said. Mr. Weil is co-author of a series of articles, "ABC of Chemical Derivatives from Petroleum", now appearing exclusively in the Technical Section of NPN.

"The Kobuta synthetic rubber projects which Koppers United is building in Beaver county will produce, upon completion, 80,000 tons per year of butadiene from alcohol, using a process developed by the Carbide Chemicals Corp.," he said. "Such production will require approximately 73,000,000 gal. of alcohol annually. In addition to butadiene, Koppers will produce 37,500 tons of styrene from coke-oven benzol."

Sees 10-15c Buna S

Improvement in production methods will make it possible to produce Buna S rubber from petroleum - butadiene eventually at a cost of 10 to 15c per lb., Mr. Weil believes. "It is estimated that Buna S will cost in the vicinity of 25c a lb. when introduced on a large scale," he said; "however, when the economies of mass production are felt in full and when technical advances discovered from actual operation are applied, it is believed that the cost of this type of rubber from butadiene made from petroleum may eventually be 10 to 15c a lb."

Butyl synthetic rubber uses raw materials of greater simplicity and lower costs than those for the other synthetic rubbers and, if certain drawbacks in its application can be overcome, it may eventually prove the "cream of the crop", said Mr. Weil. Eventual cost estimates are on the order of 7 to 15c per lb. Standard Oil Co. of New Jersey in this country developed the Butyl rubber process.

"It is the belief of many experts long associated with synthetic rubber problems", said Mr. Weil, "that, given a free economy after the war, synthetic rubber will continue to play a major role in the field of elastic materials; that synthetic rubber will not only serve democracy in wartime but will so improve in quality and decrease in price that it will continue to replace at least a major portion of natural rubber when world peace comes again."

Demand Drops

Total Demand for Oil May Decline 10% During First Quarter of 1943, Bureau of Mines Reports. Says National Rationing Cuts Use More Than Expected

NPN News Bureau

WASHINGTON—In a forecast of total motor fuel demand for 1943, Bureau of Mines April 2 said nationwide rationing has apparently reduced civilian demand to a greater degree than was anticipated.

This reduction, Bureau said, is expected to "more than offset" increase in military and export requirements, with consequent further material decrease in total gasoline demand. Also full effect of progressive conversions to other fuels of industrial and power plants using residual fuel oils, particularly in District 1, will be felt in 1943 and may largely offset expected gains in railroad, shipping and naval uses.

Total demand for motor fuel in April was estimated at 47,100,000 bbls.—10% less than actual demand in April, 1942.

Total Demand Drops

Data for first quarter of 1943, Bureau said, indicate about a 10% drop in total demand for all oils and current estimate for second quarter forecasts probable decline of about 4% in total demand, compared with corresponding period in 1942. Substantial relative increase in total demand for all oils seems probable, Bureau added, in latter part of 1943.

Bureau estimated daily average supply of domestic crude oil to meet market demand in April is 3,900,000 bbls.—268,700 bbls. (7%) higher than actual for April, 1942, which was lowest of any month last year due to liquidation of almost 10 million bbls. of refined stocks.

January Off 14%

Actual figures for January, 1943, Bureau said, show drop in demand for all oils of about 14% in January, 1942. Decrease in total demand for motor fuel approximates 25%, for residual 7%, and for distillate, 9%.

Daily average crude production and total runs to stills during the 4 weeks Feb. 6 to March 6 were 3,876,000 and 3,658,000 bbls., respectively, Bureau reported. During this period, domestic crude oil stocks increased an average of 105,000 b/d, indicating a demand for domestic crude of 3,771,000 b/d.

Montana Refinery Sold To Co-Op

Special to NPN

NORTH KANSAS CITY, Mo.—The 6000 bbl. refinery at Laurel, Mont., of Independent Refining Co. has been bought by The Farmers Union Central Exchange, St. Paul, according to *The Cooperative Consumer*, published by Consumers Cooperative Assn. here. Total investment will be $1,250,000.

Sales Executives Hear Of Oil's Role In Nation at War

NPN News Bureau

NEW YORK—Members of the petroleum industry literally "took over" the Mar. 23 luncheon meeting of the Sales Executive Club of New York when George H. Freyermuth, Standard Oil Co. of New Jersey engineer, talked on "The Petroleum Industry at War". Nearly 30 eastern oil industry executives occupied places of honor at the speakers table.

Mr. Freyermuth, who was introduced by R. T. Haslam, Jersey Standard director in charge of marketing, drew some interesting comparison from already published material, and it took the censors 3 or 4 days to clear his speech. The delay unfortunately killed a good story for eastern newspapers.

Highlight of Speech

Here are some of the highlights:

Published figures on aircraft construction indicate that the engines for these planes—spares and replacements included—must total around 15,000,000 to 20,000,000 horsepower per month. At that rate, the total aircraft horsepower produced each year is more than twice the total horsepower of all the locomotives of all railroads in this country today. All the power is supplied by 100-octane gasoline which runs through the engines of a 4-motor bomber, under full power, about as fast as it runs through a gasoline pump nozzle when held wide open.

The youngster who pilots the Republic Thunderbolt has more power under his control than the engineer of the locomotive of the Empire State Express, and even that is only about half of the power controlled by the pilot of the Martin B-26.

One-hundred octane gasoline gives our aircraft at least 20% more power with 15% less fuel for their weight and size.

Iso-octane, the synthetic which makes 100-octane possible in huge quantities, has dropped from over $20 per gal. to less than 15c per gal. The French government, in its war plans, dismissed 100-octane gasoline as a "technical impossibility". Yet "it takes only a little arithmetic to show that to fly even a small percentage of this country's known production of fighting planes for even a few hours a day would require the production of this super fuel at a rate greater than the production of gasoline for all purposes whatever in this country during World War 1."

A synthetic tire rubber industry "just didn't exist in this country in December, 1941. Yet, within less than 2 years, nearly a $1,000,000,000 synthetic industry—half the size of the entire automobile manufacturing industry in 1939—will be built."

Production of the entire rubber program from petroleum would consume only in the neighborhood of one day's supply of crude oil every year.

Over 10% of the alcohols being produced in the U. S. today are made directly from petroleum.

Oil Men Who Attended

Oil men who accepted the Club's invitation to sit at the speakers' table, besides the speakers, were Herbert Abraham, Ruberoid Co.; A. Clark Bedford, New Jersey Standard; E. A. Beverly, California Texas Oil Co., Ltd.; W. C. Burns, Richfield; Henry Byrd, Phillips Petroleum; R. K. Chandler, Stanco, Inc.; J. W. Connally, New Jersey Standard; R. J. Dearborn, Texaco Development Co.; W. L. Faust, Socony-Vacuum; Alexander Fraser, Shell; C. R. Gates, Amco Corp.; B. I. Graves, Tide Water Associated; H. T. Halle, Universal Oil Products Co.; C. F. Hatmaker, Pan American Petroleum and Transport; F. A. Howard, Standard Oil Development Co.; W. A. Jones, Cities Service; Frank W. Lovejoy, Socony-Vacuum; W. C. McTaranham, Petroleum Heat and Power Co.; G. H. Michler, New Jersey Standard; William P. O'Malley, Asiatic Petroleum Co.; Dr. Daniel Pyzel, Shell Union Oil Corp.; Dr. Frank Surface, New Jersey Standard; Marshall R. Walton, Arthur G. McKee & Co.; J. M. Woodruff, Sinclair; W. C. Yeager, Atlantic Refining; F. Glenn Morris, NATIONAL PETROLEUM NEWS; J. P. O'Donnell, *Oil and Gas Journal* and E. W. Mayo, *World Petroleum*.

Co-op Buys Cushing Refinery

Special to NPN

CUSHING—Midland Cooperative Wholesale Co. of Minneapolis has acquired all physical properties and inventory of Cushing Refining and Gasoline Co. for an undisclosed price, according to Rex L. Winget, vice-president and general manager of Cushing. The sale was completed April 1.

The refinery will be operated as Cushing Refining and Gasoline Division of the cooperative, with Mr. Winget as refinery manager. The entire present personnel will continue in present capacities with the exception of R. C. Jones, former president, who will continue, however, as president of Blackwell Oil and Gas Co., Cushing, an Oklahoma producing company.

Cushing refinery has a crude capacity of 5000 b/d. with a 2000 bbl. Dubbs cracking unit .

A.C.S. to Preview Changed Refinery Techniques

NPN News Bureau

CLEVELAND—A preview of the changes in refining company operating technique which are being made possible through research developments will be given in papers at the sessions of the Petroleum Division, American Chemical Society, at its meeting in Detroit April 12-16.

"Remarkable changes in the processing of old products and in the manufacture of raw materials not formerly commercially derived from petroleum will be discussed, as well as many improved analytical procedures on both old and new products", according to Dr. L. M. Henderson, Pure Oil Co., laboratory, Winnetka, Ill., secretary of the Petroleum Division.

A paper on the fluid catalytic cracking process will be given, prepared by E. V. Murphree, Standard Oil Development Co.; C. L. Brown, Standard Oil Co. of Louisiana; and H. G. M. Fischer, E. J. Gohr, and W. J. Sweeney, Standard Oil Co. of New Jersey.

A paper on treated or activated clay catalysts of the montmorillonite type used in the production of high octane gasoline among other purposes will be presented by R. C. Davidson, F. J. Ewing, and R. S. Shute of Filtrol Corp.

Paper on Lube Oil Service

George W. Waters and Elder C. Larson, Shell Oil Co., Inc., will give a paper on laboratory evaluation of the potential service performance of lubricating oils while Mr. Waters and Hugh D. Burnham, also of Shell, will discuss the existent and potential corrosivity of lubricating oils. Some indication of what may be obtained in the future in the way of tailor-made lubricating oils will be given through a report on the properties of mixtures of high molecular weight hydrocarbons prepared by R. W. Schiessler, D. C. Clarke, C. S. Rowland, C. H. Herr, and F. C. Whitmore, Pennsylvania State College.

Results of a study of the reactions which control the stability of butadiene during storage and plant processing will be given in a paper by Richard F. Robey, Herbert K. Wiese and Charles E. Morrell, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.

To Discuss Spectrometer

The use of the mass spectrometer in the analysis of hydrocarbon gases used in the manufacture of aviation gasoline and synthetic rubber will be discussed in a paper by O. L. Roberts, H. W. Washburn, and L. N. Leum, Atlantic Refining Co. This new and revolutionary means for the analysis of light hydrocarbons was recently announced by Atlantic.

Methods for the determination of the stability of fuel oil and controlling factors will be discussed in papers by J. R. Sabina and A. B. Hersberger, H. C. Cowles and B. Zieber, Atlantic Refining Co.

Dr. C. L. Brown, director of research and development, Standard Oil Co. of Louisiana, Baton Rouge, La., is chairman of the ACS Petroleum Division. Dr. Robert E. Burk, director of research, Standard Oil Co. of Ohio, is vice-chairman.

Won't Resign Till Job Is Done

NPN News Bureau

WASHINGTON—Commenting on published reports that he would resign July 1, Rubber Director Jeffers said April 3 that he would resign when the synthetic rubber program is completed.

"It may take 2 months, it may take 6, it may take longer," he said. "My job is to follow through and see rubber production made a fact so all military and essential civilian requirements are assured. Until that goal is accomplished, I am devoting all my time and energy to this one specific job."

Painting an *SOS* on the ocean

Two shot-down fliers are floating in a rubber life raft.

They spot a U. S. plane. One grabs a small metal can . . . whips off the cap . . . dumps the contents into the water.

A giant splotch of yellowish-green color, hundreds of feet wide, spreads across the water. Even at 10,000 feet, the pilot in the searching plane sees this brilliant distress signal.

What is in this can? What magic stuff can paint an SOS like this on the ocean? It's an amazing chemical powder, standard equipment in the life rafts of our planes.

Nothing is left to chance in safeguarding American boys. That's why this mysterious powder is packed in cans. That's why countless other war materials—food, fuel, weapons—are protected by America's favorite container, the can.

Metal cans do not break, chip or tear. They protect against temperature changes . . . against insects, water, dirt, light. Things get there—*safe*—in cans.

Some day the cans of war will be back on your shelf. They'll be better than ever. We're piling up a lot of new knowledge and experience as one of the packaging headquarters for Uncle Sam.

TO MAKERS OF WAR GOODS

Metal containers are delivering the goods *safely*—foods, supplies, and bullets arrive ready for action. Continental is making millions of these cans along with other needs, including plane parts.

Yet, rushed as we are, we can still take on more! Right now, a part of our vast metal-working facilities for forming, stamping, machining and assembly is still available. Write or phone our War Products Council, 100 East 42nd Street, New York.

It gets there-safe-in cans

DETROIT PUBLIC LIBRARY

CONTINENTAL CAN COMPANY

HELP CAN THE AXIS—BUY WAR BONDS

Did you forget to tell him what to do now?

● It's a fire-fighting axiom that the first 60 seconds of a fire are the most important. If something goes wrong then, you may have a real blaze on your hands.

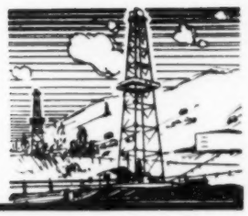
Alert management, recognizing this, carefully trains its employees to fight fire. It picks key men in the plant, teaches them how different fires behave, how various extinguishers must be handled.

Authorities agree that *demonstrations* provide the best training. So Walter Kidde & Company has prepared a booklet—"How to Teach Fire-Fighting." It tells how to stage a fast-moving, interesting, instructive fire-class. Write for your plant's copy.

Walter Kidde & Company, Inc.
429 West Street **Bloomfield, N. J.**

Kidde
HIGH PRESSURE GASES · FIRE PROTECTION
PROTECTS LIVES

PRODUCTION NEWS



'Crude Hike Fine---But', Sums Up Reaction Of California Oil Men

NPN News Bureau

LOS ANGELES—The announcement of higher ceilings in California for heavy gravities of crude oil, heavy fuel oil, and asphalt was received in the state as "good news" but with some reservation.

Perhaps the general attitude of California operators could best be summed up this way: the increase was a step in the right direction but in any industry where economic conditions are controlled by law there is likely to develop inequities and maladjustments.

Fear of inequities and maladjustments is said to be responsible for the hesitancy on the part of companies here to jump at the new ceilings. Standard Oil of California, for example, announced its new ceilings effective April 1 and not retroactive to March 26, which was the effective date of the higher ceilings permitted by OPA (*see new schedule on p.* 48). Union Oil of California, one of the larger purchasing companies in the area, has not yet announced its new price schedule. Some of the smaller refiners and marketers say they do not anticipate any price changes for several days or until they can determine their position.

Some Problems Arise

Some of the problems which have come up as a result of the higher prices are serious, economically, to the operators they affect.

An independent refiner in the Los Angeles Basin, for example, has a fuel oil contract, the price of which is based upon the price of 27 gravity crude oil at Signal Hill. Under the new schedule, the price of this crude remained unchanged so the refiner cannot raise his fuel oil prices although in general he will pay more for his crude because the price of the lower gravity crudes has been increased.

Another independent here reports that customers on the spot market are offering considerable resistance to the increased price for fuel oil and some of these, he fears, will switch to natural gas.

A rather large producer here says this of the increase: "The idea of the increase was to get more heavy oil. This I believe it will do to a certain extent. However, if you were a producer what kind of a well would you rather have? Of course, the answer is the one which produces the highest price oil and that is still high gravity."

Represents Industry Comment

Another producing company took this attitude: We don't like the idea much of selling our 22 and 24 gravity oil at the same price we sell 14 gravity junk.

Although some of the above reactions appear to be almost in direct contradiction they represent the comment of the industry on the higher price ceilings.

Most of those contacted with regard to the increase said that if all the companies would live up to the spirit of the increase, and its connection with the war effort, it would probably work out fine. However, from past experience they find that a few chiselers make it necessary to examine these matters from all angles. This is particularly true when the laws of supply and demand are not allowed to take their natural course.

Stockholders To Vote on Merger Of Creole-Lago Companies

NPN News Bureau

NEW YORK—The proposed merger of Creole Petroleum Corp. and Lago Petroleum Corp., producing subsidiaries in Venezuela of New Jersey Standard, may create the world's largest single producer of crude oil. Stockholders will vote on the merger at a special meeting here April 23. The plan follows enactment of the new petroleum law in that country, effective March 13, which provides for an extension to 40 years of present concessions, and other benefits, but imposes higher production royalties and surface taxes.

Before the war the Jersey subsidiaries were producing 300,000 b/d of crude in Venezuela, while, under present strict proration, probably no single company in the U. S. is producing 200,000 b/d. A close competitor in Venezuela is the Royal Dutch Shell interests.

The merger calls for liquidation of the Standard Oil Co. of Venezuela and Lagomar Oil Concessions, Inc., and transfer of their assets to the new Creole company, in addition to those of Lago Petroleum Corp. and Cia. de Petroleo Lago. Creole would increase its capital stock to 27,000,000 shares of $5 par value, Lago to get 19,946,658 shares. The new company, which will be known as the Creole Petroleum Corp., according to C. H. Lieb, president, will receive from the Venezuelan government all replacement concession grants previously applied for by the companies it plans to absorb.

Plymouth Buys Olson Properties

Special to NPN

AUSTIN—The Plymouth Oil Co., Pittsburgh, has bought all the leases, producing and non-producing, of the Olson Oil Co. of Midland and Tulsa, according to reports to here.

The leases are located in the Olson pool of western Crockett county, and were sold for $330,000 cash plus a perpetual override royalty and other consideration. The properties comprise a little more than 5000 acres, with two producers and one drilling well.

Cumberland Field

Discovered by Pure in 1942, It Holds an Estimated One-Third of the Combined Reserves of All New Fields Discovered Last Year. Pure Owns Field

NPN News Bureau

TULSA—The largest oil field discovered in Oklahoma during the past 10 years belongs in its entirety to The Pure Oil Co. It's the Cumberland field located on a 20,000 acre tract of leases in the Washita Valley about midway between Madill and Durant in south central section of the state. The field was discovered in 1942.

An idea of the size and importance of the discovery is gained by comparison of reserves added to the nation's total underground supply. Pure Oil estimates the reserves of the field equal to about one-third of the combined reserves of all new fields discovered in the entire U. S. in 1942, resulting from the drilling of more than 3000 wildcat wells.

Thus, it is apparent that discovery of one of nature's major pots of "liquid gold" is a comparatively rare thing—a near miracle, considering that in the Cumberland field Pure's first well was drilled in the center of the large block of leases and came in a gusher. It creates an interesting chapter in Oklahoma oil industry history, coming at a war-disturbed period when the need of a plentiful supply of petroleum products is paramount.

Field Studied in 1900

Geological study of the Cumberland field area dates back as far as 1900. Early investigations disclosed that in the Arbuckle Mountains not far north of the field, the upturned edges of the Ordovician sands, which now produce at Cumberland, were frequently saturated with heavy black oil. These oil saturated sands and reported shows in shallow water wells, also led to discovery of a number of other important oil fields in the Arbuckle Mountain region.

One of the original discoveries was at shallow depth back in 1909. Nearly every geologist in the country interested in oil has at one time or another surveyed the area, but most of them finally gave up. Not so with the Pure Oil men. They continued their search, convinced that somewhere thereabouts oil could be found in quantity. At last a structure was located and worked out to their satisfaction, then recommended for development.

Success Brings More Drilling

Quintin Little of Madill, Okla., assembled the large block of 20,000 acres of leases, and a test well was started on the center location selected by Pure's geological department. Test of the Ordovician sand was to be made.

This first well came in at a depth of 5100 ft. in the Bromide sand, making 4520 b/d of

Dominion Government Loosens Tax Brake on Production

Special to NPN

OTTAWA—After much agitation by western Canada oil interests, the Dominion government, influenced also by the demands of war, has adopted a policy of encouraging petroleum production.

Finance Minister J. J. Ilsley in his recent budget speech announced to the House of Commons that the government had decided to allow preproduction expenses to be written off for income tax purposes against any income derived from production. The rate off allowed is 40% for the first year, 30% the second, 20% the third and 10% the fourth year.

The minister also announced an increase to 25% from the 15% in the depreciation rate to be applied to all depreciable assets used in oil production, including oil drilling equipment. A special wartime depreciation allowance of 33.3% instead of 20% will be allowed on royalty payments received by investors from oil wells spudded in during the 1943-45 period.

36 gravity oil. Achieving this result together with further study of the thickness and character of the various sands encountered, led the company to deeper drilling. Apparently the field had still greater possibilities. Additional wells reached the McLish sand, which is a lower member of the Ordovician section. It also was productive, and still greater depths are now being explored.

To March 1, 66 wells had been completed and all are producing through 2.5 in. tubing and 1 in. choke, the total potential being over 50,000 b/d; but under proration only 8500 b/d is allowed. In Pure Oil's opinion, it could produce 2 or 3 times that amount without violating sound conservation practices.

Development Is Orderly

The field is being developed in an orderly fashion since it is controlled by the one company and is subject to Corporation Commission of Oklahoma regulations, established immediately following the discovery of the Bromide and McLish sands. Proper well-spacing for each of the two producing horizons has been determined, and a systematic development program worked out. Complete development, however, will have to await lifting of wartime government restrictions on material and equipment due to shortages. When this condition is passed, the field can be more closely drilled by going in on "in between" locations omitted in the present wide spacing regulations.

The oil is moved out through pipelines, largely owned or controlled by Pure. Warren Petroleum Corp. is handling the casinghead gas production in a processing plant installed in the field, and a considerable portion of Warren's products are finding their way into the war effort. Residue gas, after Warren's processing, which is not needed for field operations is sold to Lone Star Natural Gas Co. and no useful product goes to waste.

M-68 Revised

Reissued as PAO 11 without Requiring Approval for Every Well Drilled; However, PAW Can Bring About Same Re- Through the Use of Field-Wide Orders

NPN News Bureau

WASHINGTON—Selective drilling, in the sense that Petroleum Administration for War approval would be required for every well drilled, was left out of M-68 when it was reissued Mar. 30 as PAO 11, but the oil agency may accomplish the same purpose in specified areas by field-wide orders.

Such field-wide orders would be issued as supplements to PAO 11.

For several months, M-68 was in the throes of a revision. Selective drilling was one of the new features that a lot of people felt would be injected into the order. Reason behind that attitude was that PAW thought War Production Board would require control of every piece of material used by keeping a close rein on drilling before materials would be allocated to the industry.

An informed source said, however, that it later developed such controls would not be necessary.

Five Supplementary Orders

PAO 11 was accompanied by 5 supplementary orders. No. 1 dealt with gas wells, requiring specific approval except in the Appalachian area and in Oklahoma, Kansas and Missouri.

No. 2, PAW said, gives automatic approval to secondary recovery operations in eastern fields, but exceptions will be required before secondary recovery facilities may be installed in the rest of the country.

No. 3 concerned reworking of old wells in the Smackover field, and No. 4 a reissuance of M-68-3 on California heavy crude.

No. 5 was the former PAO No. 2, on Illinois, Indiana and Kentucky production.

Major changes, in new order, according to PAW, are: pumping equipment may not be installed before a well ceases to flow naturally unless it is necessary for well to meet allowable. Wells which conform to 40-acre spacing may be plugged back or deepened even if they are not the only wells on the units and are not the prescribed distance from outsets. Wells may be connected with pipelines by gathering systems provided material does not cost more than $2500 and system does not duplicate existing facilities. In sectionalized areas, drilling unit must consist of a quarter-quarter section of at least 35 acres.

Other modifications, PAW said, included: maintenance and repair defined to exclude any rtstrictions arising from accounting practices, and to include capital additions costing not more than $500; definition of condensate field replaced by specific list of 115 fields where an exception is required before any drilling can be done. An exploratory well does not include any well drilled within a proven area. All gas wells require exceptions except those in Appalachian area and in specified portions of Oklahoma, Kansas and Missouri which do not require special authorization if they meet conditions prescribed in Supplementary Order No. 1.

Supplementary order 6 under M-63, covering Hugoton gas field was superseded by PAO 11.

PAW said PAW forms 3 and 4 would be used under new order instead of OPC Forms PD 214 A, B and C.

OPA Clarifies Ruling On 'Gas' Rations For Oil Lease Men

NPN News Bureau

WASHINGTON—Clarifying its ruling on "preferred mileage" gasoline rations for persons negotiating oil leases, W. R. Koerner, OPA gasoline rationing attorney, has written to PAW Chief Counsel Marshall:

The regulations (Section 7706 (q) of Ration Order 5C) provide eligibility for preferred mileage for necessary travel for "an engineer . . . technician . . . for performing or for transporting materials or equipment necessary to perform any of the following services: . . . the exploration, discovery or exploitation of natural resources for the purpose of obtaining necessary war materials; . . . provided that preferred mileage may not be allowed pursuant to this program to any person while engaged in promotional . . . activities". We have ruled that oil is one of the natural resources which is necessary war material and that engineers or technicians are eligible for preferred mileage for the purpose of negotiating leases on behalf of companies or individuals who will utilize the lands in seeking to produce oil therefrom. In previous rulings the word "technicians", as it is used in the regulations, has been given a rather broad meaning to include any person who is highly skilled in the performance of a job which requires technical skill or knowledge. Such skill may be the result either of formal education or of many years of experience in dealing with the technical subject. It appears from these interpretations that a person who is employed either by an oil company or by an individual for the purpose of negotiating oil leases may be eligible if he can establish that he is either an engineer or a technician within the meaning of these interpretations.

The prohibition in the regulation against the allowance of preferred mileage to any person while engaged in promotional activities has been construed to bar persons who are engaged in negotiating leases for the purpose of "speculation" rather than for sale to oil producing companies or individuals. The speculation to which this interpretation referred was not the ever-present hope of disposing of leases at a price higher than that paid for them, but was intended to cover stock promotion schemes and similar "promotional" ventures. We must recognize that in most cases the speculative aspect of the transaction is an important one and furnishes the incentive for much of this development work. It is not the intention of the regulations to prevent such activities, but neither was it intended to grant preferred mileage to further stock promotion schemes.

NEW HOUDRY PROCESS CAN:

Step up the quality of present aviation gasolines!

Speed up development of super engines by providing super fuels now!

In this war, no greater scientific discovery has been made than the Houdry Adiabatic Cracking Process.

It is the latest development of Houdry catalytic research, which has already played leading parts in America's aviation gas and synthetic rubber programs.

The new process can produce a super-aviation fuel of such unheard-of high quality, that today's aircraft engines are incapable of using its full possibilities. Therefore, its most important immediate value will be as a blending agent, to raise the quality of present aviation fuels.

Better performance for today's planes

Even when used in this manner, as a reenforcer only, this super-aviation fuel will tremendously improve the performance of aircraft of current design. It will give our flyers a priceless edge in combat—in speed, range, power, maneuverability.

The ultimate benefits of the new process will not be realized until aircraft engines of radically new design are created. Engines that can utilize a fuel as far superior to current aviation fuels as they in turn are superior to a third-grade motor gasoline. Even that comparison understates the potentialities of the new Houdry Adiabatic Process.

First adiabatic plant now in operation

A semi-commercial unit is now producing super-aviation fuel by the new Houdry process. It is a large-scale proving plant with a charging capacity of 600 gallons an hour. Completed in two months time, it demonstrates the further advantages of the process from the standpoint of simplicity and inexpensiveness of plant construction, savings in time and critical materials.

Complete details of its operation and of the process itself cannot, for military reasons, be published. Qualified inquiries are invited and will be satisfied to the extent permitted by military authorities.

The new Houdry Adiabatic Process, like all Houdry processes, is available to any and all American manufacturers without restriction, under license arrangements subject to approval by the United States Government.

HOUDRY CATALYTIC PROCESSES
... FOR VICTORY IN WAR
... FOR PROGRESS IN PEACE

THE HOUDRY PROCESS CORPORATION, Wilmington, Delaware

HOUDRY FIRSTS: ***First*** to develop and commercially pioneer catalytic cracking. 16 plants in operation today, many others building. ~ ***First*** to provide catalytically cracked automobile gasoline of superior quality. More than a billion gallons a year have been produced by Houdry Process. ~ ***First*** to produce catalytically cracked base for aviation gasoline. Last year Houdry plants produced *more than 90%* of all catalytically cracked aviation gas made in the world. ~ ***First*** cracked gasoline to meet U. S. Army specifications was made by Houdry Process.

We Announce "FLYING

Now—in addition to the Famous Houdry Catalytic Cracking Process—Socony-Vacuum Announces a 2nd and 3rd Revolutionary Advance in Petroleum Chemistry.

Soon—for America's Fighting Planes—Amazing New Gasolines will permit as much as 35% Higher Power Output from Aircraft Engines—25% Heavier Bomb Loads or 15% Wider Cruising Range—as much as 30% Greater Yield of Aviation Base Stock.

The Present Octane Yardstick cannot measure the Full Power of These Great New Super-Fuels.

HORSEPOWER"

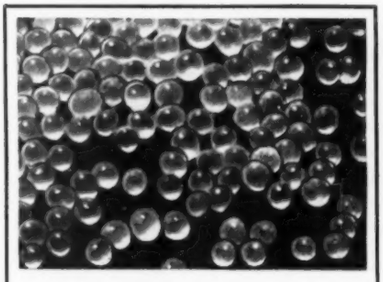
Each of the Three Processes Has Been Made Available to the United States Government and to the Entire Petroleum Industry. Socony-Vacuum Will Employ All Three — The SOCONY-VACUUM PROCESS FOR MANUFACTURING FLYING HORSEPOWER

1 After bringing Eugene Houdry to this country, Socony-Vacuum pioneered with him the development of the Houdry catalytic refining process. We were the first company to produce 100-Octane gasoline in commercial quantities by catalytic methods. From this beginning has stemmed most catalytic refining, the only method by which 100-Octane Aviation gasoline can be produced in the vast quantities needed by the United Nations' air fleets. Socony-Vacuum has produced up to now more catalytic cracked base stock for 100-Octane gasoline than any other company.

2 Today, the TCC Process (Thermofor Catalytic Cracking), Socony-Vacuum's *second* great contribution in the refining of vital aviation fuels, is being installed in 20 American refining units (7 of them ours). The TCC Process permits *continuous* catalytic refining, *improves the quality and increases the quantity of 100-Octane base stocks.* It requires less critical materials — steel and alloys — than any other catalytic process.

3 Close on the heels of the TCC Process comes Socony-Vacuum's *third* revolutionary scientific discovery, the Synthetic Bead Catalyst, described in the picture here. For many years, 100-Octane (which means without knock) has been the standard of gasoline performance. 100-Octane has been a synonym for perfect. Now, Socony-Vacuum's sensational Bead Catalyst makes possible the production, in commercial quantities, of a *new and better gasoline* — which can produce as much as 35% more power than any present 100-Octane gasoline — so powerful it can be greatly diluted for use as an ingredient in 100-Octane gasoline. Even thus diluted, this remarkable fuel will give to aircraft a new, quick maneuverability, speed, climbing power, and carrying capacity.

In one great raid on Berlin, it would have enabled the bombers used to carry *200 extra tons of bombs.* And — with the new "Flying Horsepower" — British pilots would have been able to fly 22,000 miles farther in a recent 24-hour period *without increasing their gasoline load!*



MAGIC BEADS!...Catalysis is defined by Webster as "a chemical change effected in a compound by an agent that itself remains stable." Socony-Vacuum's revolutionary new catalyst is a porous bead...looks much like a pearl, is iridescent in its original form. The gasoline cracking stock passes in a continuous stream through the porous beads, undergoes a remarkable chemical change, assumes octane and power values unknown before.

TUNE IN RAYMOND GRAM SWING—Blue Network, Coast-to-Coast, 10 P. M., E. W. T., Mon. Tues. Wed. Thurs.

SOCONY-VACUUM OIL COMPANY, INC.

and Affiliates: Magnolia Petroleum Company, General Petroleum Corporation of California.

With the ASSOCIATIONS

Oil Compact Demands Price Rise

Meeting at Wichita Calls on PAW, OPA, WPB and WMC to Relieve Also Manpower and Materials Shortages which Hamstring Wildcat Activity

By NPN Staff Writer

WICHITA, Kans.—Need for an increase in petroleum prices to stimulate additional discoveries, promote secondary recovery operations, and keep in operation the stripper wells controlling almost a fifth of the nation's known reserves, was the constant chord sounding through discussions at the spring quarterly meeting of the Interstate Oil Compact Commission here April 2-3. Gov. Andrew F. Schoeppel, of Kansas, chairman of the compact commission, presided.

Asserting that "the oil producer is faced with shortage of funds, manpower and materials," the commission, in its final executive session, voted a resolution requesting the President and Congress to instruct PAW, OPA, WPB and WMC to act immediately to relieve the distress of the independent producer. The resolution demands an "adequate" increase in price of crude oil, accompanied by products price adjustments, "in order that new life be put into prospecting for oil, that abandonment of stripper wells be thereby retarded, and that secondary methods of recovery may be made financially possible in many oil fields"; and also "that immediate steps be taken to relieve the critical material and manpower shortages."

In support of this demand, the resolution states:

Resolution Cites Shortages

"There is grave and deep concern among us that there is imminent a serious shortage of current produceable oil in this country.

"We are consuming this most vital war material at least twice as fast as we are discovering new fields.

"The oil producer is faced with shortage of funds, manpower and materials. The price of oil has been fixed at a very low level while drilling and operation costs have constantly risen.

"Many independent oil producers are thus being forced out of business. The independent has in the past discovered most of the new oil fields. He will do it again if the government will permit the price to advance to cover costs and provide a proper incentive. This method has always worked in an economy of free enterprise. It is reasonable to assume that it will now again provide the oil. There should be no further delay in applying the known historic American method of finding oil."

Committee sessions opened the 2-day meeting on April 2. That afternoon an open forum discussion of problems uppermost in the minds of those present was held. During this discussion, Col. Ernest O. Thompson of the Texas Railroad Commission expressed fear that "we will be caught short of oil for combined military and domestic purposes" unless a price increase is granted. Said Col. Thompson: "We are consuming oil as a nation at a rate twice as great as we are discovering new pools. We are, in fact, drawing on our capital account and every barrel of oil that is being sold today is being sold at less than the cost of replacement. By the end of 1943, all profit production will have disappeared."

He was not recommending, he said, "that oil at this time should be raised to $3.75 a bbl., but I do say that it should be raised 25 or 50c at a time until sufficient pools have been discovered to insure our adequate supply for military and civilian needs, at least for the next 3 to 5 years."

Downing Criticizes PAW

The subject was further developed by Warwick M. Downing, representing Gov. John Vivian of Colorado, who said:

"Inasmuch as wages have gone up in price, all materials have gone up in price, skilled labor is almost impossible to obtain, and inasmuch as oil is hard to find and wells must be drilled deeper than heretofore, it is absolutely impossible for the average independent who must be relied upon to do the successful dis-

Kansas' Gov. Andrew F. Schoeppel (center foreground), chairman of the Interstate Oil Compact Commission, photographed with the compact's executive committee at the April 2-3 meeting in Wichita, Kans.

A 42½-ton Pan American Clipper being serviced with gas and oil in Tri-Sure-equipped drums, before flying with vital war equipment to Africa.

AFRICA BOUND!

This vital air service demands big, fast powerful planes — and gas and oil that are protected by Tri-Sure Closures

No chances can be taken with a Clipper's oil supply. Drums are sealed with leak-proof, tamper-proof Tri-Sure Closures.

Photographs courtesy Pan American Airways

Africa bound! These giant Pan American Clippers are a symbol of America's pre-eminence in the air, as they speed war-vital men and materials across the ocean, and help to maintain one of America's most important aerial lifelines.

On this gigantic ferry service the precious fuel, on which depends so much the safe carriage of human lives and war materials, is safeguarded by Tri-Sure's perfected seal, plug and flange.

Tri-Sure
Reg. U. S. Pat. Off.
CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK, N. Y.
TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

PAW's director of reserves, William B. Heroy, who addressed the compact meeting

covery work to hope to engage in any exploratory work."

Criticizing silence of PAW Chief Ickes upon subject of price increase, he said: "If PAW cannot do the job, or is afraid to do the job, or cannot make up its mind, it should resign or be removed, and its functions transferred to some other persons or agency that would at least try."

At a Saturday morning general session, the compact heard an address by William B. Heroy, PAW director of reserves, on "A Survey of the Nation's Petroleum Reserves and Needs", and a summary report by E. G. Dahlgren, technical secretary of the compact's research and coordinating committee, on completion of the committee's stripper well survey through 1942.

Findings of Survey

The findings of this survey, prepared in cooperation with the National Stripper Well Assn. and first presented before the December quarterly meeting, were incorporated in the compact's findings and recommendations at this meeting. These findings emphasized the necessity for "parity" prices on petroleum to stop the present accelerated rate of abandonment. During the last 8 years, the survey revealed, 72,405 stripper wells with estimated reserves amounting to 248,816,936 bbls. were abandoned and plugged. Since Pearl Harbor more than 13,000 stripper wells have been abandoned and the plugging rate is increasing.

Pointing out that on Jan. 1, 1943, stripper wells constituted 72% of the nation's producing oil wells, producing 14.7% of the total production and overlying about 18% of our present estimated proven reserves, the compact declared it is "imperative that stripper production be maintained".

The importance of price in determining the ultimate recovery of petroleum reserves was recognized in Mr. Heroy's address. "In the case of fields that are approaching exhaustion and in which the wells are in the stripper stage," he said, "the factor of price of oil exerts a substantial influence on reserve estimates. Where wells are economically marginal and close to the point of abandonment an increase in revenue would tend to prolong the life of the wells and thus increase the ultimate recovery."

'Not in My Hands'

Mr. Heroy, however, declined to comment on PAW's position on a present price increase when questioned during informal discussion following his paper.

"The matter is not in my hands," was his only reply.

Mr. Heroy pointed out what he called "critical defects" in the discovery picture. He gave figures showing that while total proven reserves have increased steadily from 1908 to the present, the annual rate of increase began to fall off in 1940.

More important, the part of the increase representing new discoveries began a sharp downward trend in 1937, dropping from 929,000,000 bbls. that year to 260,000,000 bbls. in 1942, or to only 28% of the peak figure. Extensions of known fields and revisions of previous estimates, making up the rest of the reserve increase, began to decline more slowly—but just as surely.

Adding to the seriousness of the picture is the fact that in every year since 1937 the initial daily production of new wells has greatly decreased, from an average initial production per well of 1077 b/d in 1937 to 259 b/d in 1942, or to approximately 25% of the 1937 figure.

"When it is considered that it is the relatively young wells which yield the flush production and that we are dependent on such wells for 85% of our production, the decline in initial production becomes cause for serious concern," Mr. Heroy commented.

Urges 'Untization'

Declaring that it is urgently necessary for both state and federal authorities "to place ourselves squarely behind every measure that will stimulate new discovery and increase productive capacity", Mr. Heroy urged unitization as the "vehicle whereby productive capacity can be increased, the use of critical materials minimized and manpower requirements reduced".

PAW, he said, will "welcome your full cooperation in seeking to achieve those objectives".

Lively discussion from the floor followed Mr. Heroy's address, chiefly centered around unitization. Answering a question on the attitude of PAW on the industry's cooperation thus far, Mr. Heroy said PAW has "gone to bat for critical equipment for repressuring operations" and otherwise has furthered such operations mainly by "moral support". PAW has believed, he said, that any form of compulsory action had best be left to "the normal operation of state laws."

Asks Action on Crude Line

A second resolution adopted by the compact's executive committee asked PAW and WPB for earliest possible consideration and favorable action on materials requirements for a pipeline from west Texas to Oklahoma, to deliver crude into trunk lines supplying mid-western refineries (*see p.* 28).

These refiners are now drawing on stored oil to supplement inadequate supplies from Kansas, Oklahoma and other mid-western states, the resolution stated, adding "the exhausting of storage oil now available will adversely affect the full scale operations of these refineries and in turn cause a shortage of petroleum products for war. . . ."

About 90 members and observers were in attendance at the program and forum discussions.

° ° °

Program of Education Studied by Compact; May Make Movies

By NPN Staff Writer

WICHITA, Kans.—Plans for an educational program, using motion pictures to tell the story of oil and gas conservation, are expected to be completed at the May 1 meeting of the Interstate Oil Compact Commission's executive committee, following discussions of the proposal at the compact's meeting here April 2-3.

J. C. Hunter of Abilene, Tex., first vice-chairman of the compact and originator of the idea, outlined the proposed program to members and observers at the meeting here April 2. The type of picture that might be made was demonstrated by 3 films from the Bureau of Mines: "The Evolution of the Oil Industry", made by Sinclair Refining Co., and "Oil" and "Trouble Lurks Below", both produced by Humble Oil & Refining Co. M. F. Leopold, supervising engineer of the Bureau of Mines' picture division, explained techniques used in the first picture, and Dick Coneway, Humble engineer, presented the others.

The compact's program would be available for presentation, upon request, before legislatures, industry conventions and public meetings. It could illustrate and explain such functions as production of oil from the reservoir; utilization of bottom-hole pressure, pressure maintenance and gas-oil ratios; cycling and recycling operations; stripper wells; repressuring and secondary recovery operations; salt water disposal; refining operations and other specialized subjects.

Aims of Program

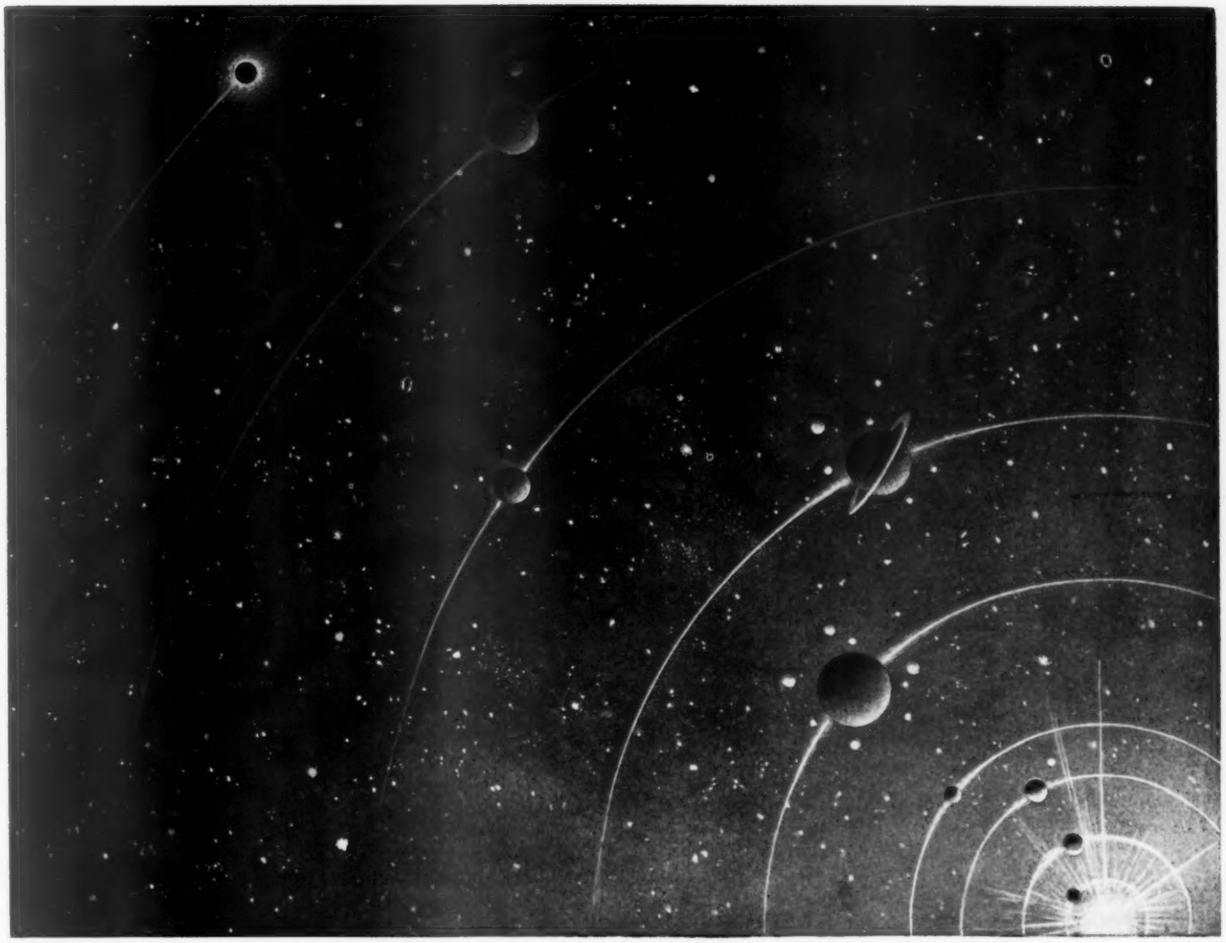
Judge Hunter said it should be planned so as to convince those to whom it is presented that:

1—Conservation of oil and gas is desirable.

2—This is a state function and state regulatory authorities, with federal and industry cooperation, are doing a good job.

3—The Interstate Oil Compact Commission is furnishing a valuable interstate public forum to study and solve conservation problems.

4—The petroleum industry, by hard work and modern engineering efficiency, is furnish-



Is Pluto the Last of the Planets?

Nobody knows. It is dangerous to predict a limit in any field of research or science. The very mysteries of space—substance—energy—life—are forever quickening the human impulse to new explorations. . . . And yielding new discoveries!

Take the energy we call *power*. Successively through its journey out of darkness, the world has seen power wrung from the muscles of man and beasts of burden—from winds and from waterfalls—from steam, electricity and chemistry.

Momentous are the developments in the chemistry of petroleum. Even when it seemed that we had reached the last of its contributions to power which could be harnessed to do man's bidding, new reactions and refinements have been perfected to heighten the usefulness of petroleum's God-given elements.

Badger engineering is in the thick of this progress—designing, building, improving and speeding equipment for the processing of both old and new products of the petroleum industry. Toward more power for planes, trucks, tanks and other war machinery, Badger is currently constructing large and small plants for the production of high-octane gasoline.

Also in Badger's capable hands is the building of plants for the manufacture of butadiene, toluol, alcohols, explosives, acetic acid, phthalic anhydride and other chemical products.

From these stores of experience are coming still greater Badger facilities for helping industries to fight the battles of competition in the readjustment era which lies ahead.

LICENSING AGENTS FOR THE HOUDRY CATALYTIC CRACKING PROCESSES

E. B. Badger & SONS CO.

BOSTON . . . . EST. 1841

NEW YORK • PHILADELPHIA
SAN FRANCISCO • LONDON

Process Engineers and Constructors for the Petroleum, Petro-Chemical and Chemical Industries

ing a vital and essential commodity at a very low cost.

Ways and means of producing the program and of raising the necessary funds—estimated at $25,000 to $30,000—were left unsettled until the next meeting of the compact's executive committee.

° ° °

4 States Act To Extend Compact

By NPN Staff Writer

WICHITA, Kans.—Legislation extending membership in the Interstate Oil Compact Commission from Sept. 1, 1943, to Sept. 1, 1947, has been passed by Kansas, Michigan and Texas and has been introduced in Illinois, according to Charles L. Orr, secretary of the compact. He said governors of other member states, under enabling statutes, are empowered to execute extensions unless the terms or provisions of the compact are changed.

Extension of the compact for a 4-year period instead of 2 years as has prevailed from the compact's beginning in 1935 was recommended by the compact extension committee at the last quarterly meeting in December. Original reason for the 2-year period was that the Connally Act and the Texas conservation law were 2-year statutes at the time the compact was first drawn up. Now that both laws have been made permanent, no objections remain to extensions for longer periods. By terms of the compact, any member state may withdraw upon 60-day notice, and Congress retains the right to repeal its consent at any time.

Texas-Oklahoma Line Studied

NPN News Bureau

TULSA—Stanolind Pipe Line Co. has prepared for submission to PAW a PD-200 for materials to construct a 16-in. pipeline from west Texas to central Oklahoma, according to reports here.

The line would originate in the Slaughter field in Hockley county, Tex., and connect with Stanolind's main line at Drumright, Okla. It could also connect, in the Cushing-Drumright area, with lines of Texas, Texas-Empire, Shell, Empire, Gulf, Sinclair, OPL-Ajax, Magnolia, Standish, Mid-Continent, Tide Water, Continental and Champlin.

Initial capacity would be 54,000 b/d, which could be increased by the addition of intermediate stations up to 116,000 b/d.

It is reported the project has not yet been approved by Stanolind's board of directors.

A.P.I. Southwestern District To Meet April 29-30

Special to NPN

DALLAS — The regular spring meeting of the southwestern district, American Petroleum Institute's division of production, will be held at the Rice Hotel, Houston, April 29 and 30, A.P.I. announces.

On the program committee are:

D. W. Carter, Dallas, Magnolia Petroleum Co., chairman; A. W. Baucum, Houston, The Texas Co.; Harold Decker, Corpus Christi, Seaboard Oil Co.; George H. Fancher, Austin, University of Texas; L. W. MacNaughton, Dallas, DeGolyer & MacNaughton; and M. A. Wright, Shreveport, The Carter Oil Co.

Policies and producing practices helpful to the war effort will be discussed.

Jobber Buying Out of State Not Under Wage-Hour

NPN News Bureau

CLEVELAND—An oil jobber who buys petroleum products refined in another state and sells them in his home state is not engaged in interstate commerce and his employes are not subject to the wages and hours requirements of the Federal Fair Labor Standards Act, recent decisions of the U. S. Supreme Court have held, according to Hubert B. Fuller, general counsel, Ohio Petroleum Marketers Assn. These decisions sustain the opinion expressed twice publicly by Mr. Fuller, once as early as in 1938.

Mr. Fuller's interpretation of 2 recent cases decided by the Supreme Court as they apply to the oil jobber is that where a jobber receives his gasoline and other products from another state, and the shipments are made to his bulk plant, from there delivered by his employes to dealers, commercial consumers and others in the ordinary course of business, and to fill whatever orders may be received and purchases made, such jobber is not engaged in interstate commerce, provided all of his sales and deliveries are made in the state in which his bulk plant is located.

Exception Noted

The exception to this is in instances where a jobber purchases definite quantities of petroleum products to fill prior orders of specific customers, then such products are moving in interstate commerce until actually delivered to the customers. Employes handling those specific orders are within the wage-hour provisions of the law and must be paid time and a half their regular rate of compensation for hours worked over 40 per week.

The two cases recently decided by the Supreme Court are: Walling vs. Jacksonville Paper Co. and Higgins vs. Carr Bros. Co., in which it was held that employes are not within the wage-hour provisions of the Fair Labor Standards Act because they are engaged in selling goods manufactured in another state and from there shipped to the warehouses of their employers for resale in the state in which they are employed.

Indiana Standard Introduces Higher Priced Tractor Fuel

NPN News Bureau

CHICAGO — "Standard Power Fuel" is the brand name of a new type tractor fuel being introduced by Indiana Standard "to meet the growing demand by farm trade for a volatile tractor fuel".

The product will be marketed throughout Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Wisconsin, North and South Dakota. It will be placed on sale at bulk plants as soon as present stocks of "Standard Tractor Fuel" are exhausted. The old type product is being discontinued.

Announced ceiling price of the new product will be 0.5c gal. above the ceiling established for "Standard Tractor Fuel" under Revised Price Schedule 88 prior to the advance of 0.3c gal. effective last Dec. 29, in all of the 10 states with exception of Kansas. The new fuel will thus be 0.2c higher than the old in all states except Kansas, where it will be 0.5c higher, the company said.

Sale of "Standard Tractor Distillate" in South Dakota, and "Nakota Tractor Fuel" in North Dakota will also be discontinued as fast as the new type is received at bulk plants.

New Insurance Offers Protection To Ride-Sharing Participants

NPN News Bureau

NEW YORK—Two specialized automobile liability coverages designed to assist in the promotion of ride-sharing plans for the transportation of employes to and from their work have been announced by the National Bureau of Casualty and Surety Underwriters and the American Mutual Alliance. Both forms are the outgrowth of conferences with federal departments and agencies interested in the ride-sharing problem.

One form is a restricted coverage for a previously uninsured car owner giving protection against passenger hazard created by using his car under such a plan, while the other provides protection for an employer against possible liability arising out of his participation in the establishment or operation of such a ride-sharing plan among his employes.

The new coverages are available in all states except Massachusetts, Texas, and, until further notice, Virginia. In New Hampshire restricted coverage for owned automobiles may not be written, but the restricted coverage for employers has been approved.

Sunoco Fibre Drum Wins Award

NPN News Bureau

NEW YORK—A new fibreboard grease drum developed by Sun Oil Co., Philadelphia, won a major award at the 12th annual All-America Package Competition here.

The new container, developed following WPB Order L-197 prohibiting use of steel containers in packaging certain products, requires less than 1 oz. of steel per 100 lbs. of packed grease, compared with 16 lbs. of steel required by former steel drums, the Sun company says. The filled container it adds, sells at the same price as the filled steel drum, protects contents fully and is as easy to handle in shipping. The container is brown and bears the Sunoco label in blue and yellow.

Ethyl Advertising Wins Honors

NPN News Bureau

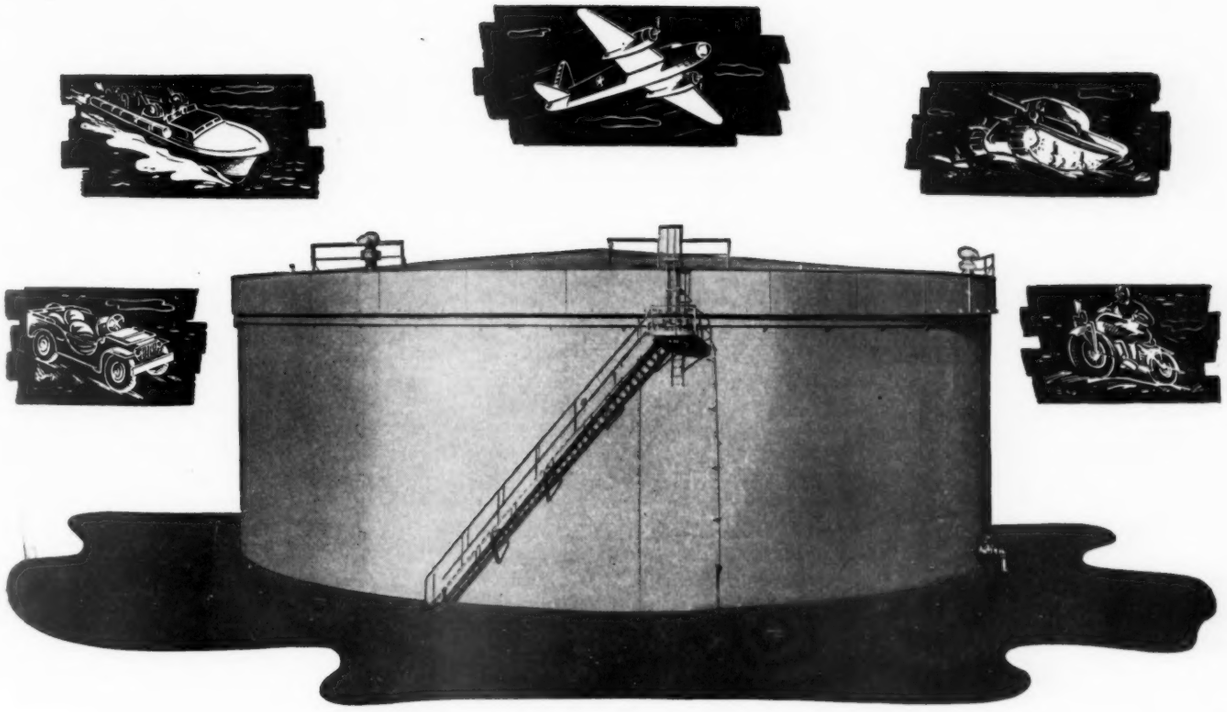
NEW YORK—One of the 3 best advertising campaigns appearing in national magazines in 1942 was Ethyl Corp.'s "What's In A Name?" series, which won honorable mention from the Annual Advertising Awards started by the late Edward Bok through the Harvard Graduate School of Business and sponsored by *Advertising & Selling*.

Over 1,000,000 booklets offered in each advertisement have been sent to inquirers, according to the March *Ethyl News*.

South Dakota Tax Revenue Off

Special to NPN

PIERRE, S. D.—Total motor fuel tax and inspection fee collections for February in South Dakota were $330,411.18, as against $401,846.55 for the same month of 1942. The decrease of $71,435.37 is more than 17%.



Saving Volatiles for Victory!

GRAVER EXPANSION ROOF

Today practically every branch of the armed service travels on gasoline. And for that very reason it is more important now than ever before to conserve every drop of gasoline — to avoid waste at every step from oil well to Uncle Sam. Gallons that are wasted will never go to war.

This is particularly true of evaporation losses, for not only does evaporation affect quantity, but quality as well. A 4% evaporation loss means a 3 point drop in octane number.

Graver Expansion Roofs put a stop to this loss, for, wherever used, either on a single tank or manifolded to serve a whole battery of tanks, *there is no evaporation.* Designed and built to hold the vapors instead of expelling them, the Graver Expansion Roof automatically enlarges the vapor space as needed, rising or falling as the vapors expand or contract.

Write Graver today. Learn how Graver Expansion Roofs are serving major oil companies all over the country—how they are conserving *Volatiles for Victory.*

STEEL STORAGE TANKS
•
VAPOR CONSERVATION SYSTEMS
•
WELDED CONSTRUCTION
•
STRESS RELIEVING
•
X-RAYING
•
FABRICATED STEEL AND NON-CORROSIVE PLATE
•
WATER SOFTENERS
•
FILTRATION SYSTEMS
•
CLARIFIERS
•
SEWAGE EQUIPMENT

GRAVER

GRAVER TANK & MFG. CO., INC.

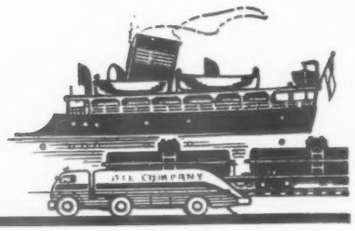
NEW YORK
CATASAUQUA, PA.

4811-17 Tod Ave.
EAST CHICAGO, IND.
CABLE ADDRESS — GRATANK

CHICAGO
TULSA

43-6-S

Oil TRANSPORTATION



Truck Stockpile

As Nation's Supply Dwindles, Capitol Hill Stirs Itself To Probe Restrictions on Highway Transportation. WPB May Allow Manufacture of More Units

(This is the first of a series of NPN articles on wartime problems facing the trucking industry generally and tank trucks particularly. Another article will appear in the next issue—Ed).

By Oliver Knight, NPN Staff Writer

WASHINGTON—Congress is getting set to give government agencies a good going-over for limitations placed on highway transportation, amidst indications that WPB may permit manufacturers to resume production of trucks and trailers this year.

Cries for an investigation of highway transport are arising on both sides of the Capitol. Just a couple of blocks down the street, WPB is figuring that heavy trucks in the rationing stockpile will be exhausted before the summer is over and admits it may have to approve the manufacture of some more units.

Sen. Gillette, Iowa, introduced Senate Resolution 121 on March 30, calling for the Interstate Commerce Committee to investigate "to what extent the civilian economy and the war effort of the nation are affected by the limitation placed upon the manufacture of trucks and trailers for the transportation of products over the public highways of the United States."

On the House floor on March 30, Rep. Johnson, Ill., proposed a similar investigation. He emphasized that farm trucks could hardly be expected to handle the same amount of produce as in 1942, much less the additional 17% to 28% in vegetables, livestock and poultry. He urged that Congress take up the matter at once, rather than wait for WPB "to miss the signals on this all important subject of highway transportation."

Asks Probe by Truman

Sen. McCarran, Nev., wrote Sen. Truman—Congress' ace investigator—to look into highway transportation in the West. He enclosed a resolution adopted by the Nevada legislature memorializing Congress to act at once because western states are so dependent upon trucking.

Concern expressed over the problem is not without foundation. The stockpile of new trucks held for rationing, which at its peak contained only 185,188 vehicles, has dwindled in the last year to 82,328, including 21,852 light trucks, 55,046 medium trucks and only 5430 heavy trucks.

Heavy trucks are expected to be used up by August 1 of this year and some doubt has been expressed that they will last that long. Light and medium trucks are expected to be exhausted by July, 1944.

With this in mind, WPB said on March 24 that "there may be some further production of medium and heavy trucks."

If production is resumed, however, the units manufactured can be expected to be the minimum number needed to meet the most essential demands.

What those demands are is a hard figure to pin down, but there have been unofficial reports that war agencies told WPB 17,000 medium and heavy trucks and 15,000 trailers will be required this year to meet essential needs.

Because ODT is now a claimant agency under the Controlled Materials Plan, the job of anticipating truck requirements comes within its province. It is known that ODT is recommending truck production for the third quarter of this year, but officials decline to reveal how many units they want built since their program has not been approved.

Support can be found for a truck production program which would maintain an even flow of vehicles from factory to buyer rather than a sudden burst of activity which would fill up the stockpile and then cease again.

Some time ago WPB permitted the manufacture of 3580 heavy trucks to replace those in the rationing stockpile, intended for civilian use, which the military took. But on April 1, the figure was trimmed down to 3017.

Adequacy of trailers to handle farm produce apparently is causing concern in WPB, too. Under consideration is a proposal to build 2000 trailer chassis of 5 types.

April Truck Tire Quotas Hiked

NPN News Bureau

WASHINGTON—Tire quotas will now be assigned to OPA's 109 district offices instead of by states, it was announced Mar. 31. Purpose, an OPA spokesman said, is to make tire rationing easier to administer.

April quotas are:

Passenger car tires—Grade I, 506,000 compared with 321,827 in March; Grade II, 552,000 against 253,000, Grade III, 598,000 against 644,000; tubes, 736,000 against 735,914.

Truck tires—368,000 against 299,000 in March; recaps, 552,000 against 460,000; farm tractor and implement tires, 59,800—the same as March; truck tubes, 338,100 against 292,100.

Kill Florida Canal Appropriation

NPN News Bureau

WASHINGTON—By a vote of 21-19, the House Appropriations Committee on Mar. 31 struck from the War Department civil function supply bill for 1944 an item of $44,000,000 for construction of the Florida barge canal.

In a report, the committee stressed that the canal "cannot be looked to for any alleviation of the fuel oil or gasoline shortage in the eastern seaboard area for many months."

Speed Unloading

Million Dollar Improvement Program on 23 Eastern Tank Car Termini Expected To Hike Unloading 'Potential' 200,000 b/d. Biggest Project Approved

NPN News Bureau

WASHINGTON—ODT is pushing a $1,000,000 program for the construction of tank car unloading facilities along Eastern Seaboard from Norfolk, Va., to Portland, Me., which will increase car handling capacity by 950 cars daily. ODT estimates the increase in car handling capacity will add 200,000 b/d to the unloading "potential" on East Coast.

Twenty-three terminals are affected by the program under which oil companies and railroads will expand unloading facilities. Final agreements are already signed on biggest part of the program—a $615,500 job at Tremley, Carteret, Sewaren and Bayonne, N. J., on New Jersey Central Railroad. Remainder of the program is contingent upon WPB approval.

P.I.W.C. and Assn. of American Railroads, ODT said, made surveys of where additional facilities were required. PAW then designated which oil companies, on the basis of the surveys, needed terminal improvements, ODT said.

Both oil companies and railroads, ODT continued, will build the facilities under arrangements worked out by ODT, PAW and Defense Supplies Corp.

Will Take 2 to 10 Weeks to Build

From 2 to 10 weeks will be required to build the various projects.

While noting the unloading "potential" along the East Coast would be increased by 200,000 b/d, ODT Eastman—who announced the program April 3—said the precise amount by which eastern shipments would be augmented could not be predicted because too many variable factors are involved.

"That this increase will be considerable," he said, "is indicated by the fact that unloading facilities have acted as a ceiling on the volume of oil which could be moved eastward by rail. Recent efforts of the railroads and the ODT to improve the operation of solid-trains, which carry the bulk of the rail traffic of petroleum to the East, have bumped up against this ceiling."

Other Projects Await Approval

Projects yet to be approved by WPB include improvements at Providence, R. I., on the New York, New Haven and Hartford Railroad and the following oil company installations:

Shell Oil Co., at Waltham, Mass., Sewaren, N. J., and South Portland, Me.; Cities Service Oil Co., at East Braintree and Malden, Mass., and Linden and Perth Amboy, N. J.; Atlantic Refining Co. at Kettle Point, Mass.; General American Tank Storage and Terminal Co. at

INDEPENDENTS!

THIS IS THE RIGHT SYSTEM! PLAY IT RIGHT!

YOU, as an Independent merchant, are doing business under the one system that makes it possible for you to engage in a business of your own—the American system of Free Enterprise. The magic ingredient of this system, logically enough, is the element of ENTERPRISE. Without enterprise as the motive power, the system could not work. In a free and independent business, enterprise is like gas in a car. A full tank takes you the longest distance.

Thousands of Independent tire dealers and distributors have proven their claim to enterprise by lining up with Armstrong. As a result they enjoy timely advantages in two important ways. They buy right. They sell right.

Here are some of the advantages which enable Armstrong Independents to make a profit, stay in business and help keep the nation's cars and trucks in vital war-time service.

Tires for War Workers

Ask any Armstrong Independent the real story about the famous written Guarantee—(yes, it's still in effect)—on Armstrong's regular line (Grades I and II) passenger car tires. It's an eye-opener!

Armstrong's "Standard" tire (Grade II) is a prime favorite with the vast army of men and women in the war plants. A genuine "high profile" molded tire, the "Standard" gives splendid mileage at surprisingly low cost. Wherever there's a war plant in the neighborhood, Armstrong Independents have built a fine business on this sturdy, good-looking tire.

Tires for Truckers

At any speed and with any load Armstrong Truck Tires are ace-high for trouble-free endurance. The fame of their unsurpassed carcass strength brings truckers to the doors of Armstrong Independents, from coast to coast. Let us show you the record.

Rubber-Saving Mileage

Every Armstrong Independent has a firmly established reputation for tires that give long mileage service—vitally important now and a real asset when conditions change. Be sure to get facts about those Extra Miles that Armstrong tires actually do deliver.

Immediate Full Profit

Armstrong's long-standing policy of allowing *the lowest net discount* AT THE TIME OF PURCHASE is a tower of strength for Independents who cannot afford to speculate on "hope deferred."

Absolute Territorial Protection

Armstrong Independents rest easy on this question. They have no worries under Armstrong's straightforward policy. Every Dealer and Distributor is protected in his territory. Ask any Armstrong "old-timer."

The Armstrong Square Deal Plan

The backing of Armstrong's 7-Point Program gives an Independent the weapons he needs to win the battle for survival in war and in peace. It enables and encourages him to use ENTERPRISE in the conduct of his business and to become a worthy example of the soundness of living and working under the system our nation is fighting to defend—the American system of Free Enterprise.

★

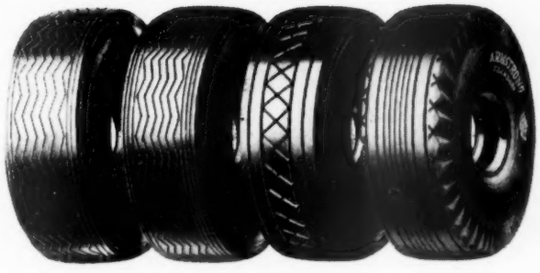
It takes but an ounce of enterprise to

WRITE FOR FULL DETAILS

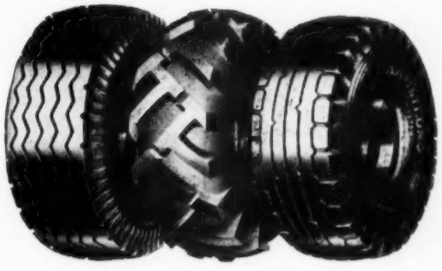
of the Armstrong Plan for Independents

THE ARMSTRONG RUBBER CO.,
WEST HAVEN, CONN.

ARMSTRONG PASSENGER CAR AND TRUCK TIRES



The strongest guarantee in the industry—unmodified even in wartime—has always stood behind Armstrong's line of regular passenger car tires. No tires will give your customers greater mileage service than these Armstrong tires of high-profile, compression-tread construction.



The phenomenal carcass strength of Armstrong truck tires is well known to truckers. These tires have broken records for load-miles time and again. Complete line up to 14.00-24 size includes Over-the-Road, Delivery, Mud-and-Snow and Military Type Non-Directional Mud-and-Snow treads.

ARMSTRONG TIRES FOR WAR WORKERS

We have a full size range of Armstrong passenger car tires for war workers.
Send us your inquiries.

THE ARMSTRONG RUBBER CO. GENERAL OFFICES AND PLANT—WEST HAVEN, CONN.
SOUTHERN PLANT—THE ARMSTRONG TIRE & RUBBER CO., NATCHEZ, MISS.

Carteret, N. J.; Socony Vacuum Oil Co. at East Boston; Sinclair Refining Co. at Tremley, N. J.; Hartol Products Corp. at Revere, Mass.; Sun Oil Co. at Marcus Hook and Twin Oaks, Pa.; New Jersey Standard at Bayway, Bayonne, N. J., and Norfolk, Va.; Pan American Petroleum & Transport Co. at Carteret, N. J., and Chelsea, Mass.; and Texas Co. at Bayonne, N. J., and Norfolk, Va.

OPA Clamps Price Lid On Used Trucks To Halt Speculation

NPN News Bureau

WASHINGTON—OPA's price ceiling on used trucks, effective April 26, was a direct thrust at speculators who have been buying trucks and selling some at greatly inflated prices and holding others against the day when even higher prices could be asked.

OPA said trucks have been sold in some instances at prices 200% or more above the normal value of a used truck. Further, OPA charged, more than 70% of all reported sales of 1941 models last August and September exceeded the delivered price of the vehicles when new.

Some weeks ago, ODT said it might be necessary to ration used trucks because some were being hoarded. At that time, ODT said a price ceiling would precede rationing. An ODT source hinted, however, that rationing might not be necessary since the price regulation might accomplish the same purpose as rationing—force trucks out of speculators' hands.

Order Contains 124 Pages

The regulation, MPR 341, was one of the most voluminous issued. It was 124 pages long and contained 8000 specific prices for which commercial vehicles sold when new.

The "new" prices were included because the ceilings for used trucks are a percentage of the new value. For instance, a truck less than 6 months old can sell for 90c of its value when new, but a truck more than 72 months old has a ceiling price that is 26% of its "new" price.

A specified percentage increase may be added to the ceiling prices when a truck is reconditioned and guaranteed for 1000 miles or 30 days.

Truckers Fear Parts Diversion

Some truck men feel, however, that this might work some harm because, they say, it may divert good parts to bad vehicles. They base their contention on the fact that the regulation permits addition of the price of a part to the ceiling price.

Regulation applies to trucks, tractors, full-trailers, semi-trailers, ambulances, hearses, omnibuses, carryall suburbans, delivery sedans, utility sedans, couples fitted with pickup boxes, cab pickups, as well as chassis and bodies for all of them.

OPA said the regulations do not cover passenger cars, taxicabs, station wagons, vehicles operated on rails, self-tracklaying vehicles, or farm and garden tractors designed and used for agricultural purposes.

'Big Little Inch' Pipeline Approved by WPB; Work to Start Shortly

NPN News Bureau

WASHINGTON—PAW was about a month ahead of itself in winning WPB's approval of the eastern extension of the 20-in. products line, dubbed the "little big inch", which will pump 235,000 b/d from Texas refineries to New York 1390 miles away.

PAW's original plans contemplated that the eastern extension would go before WPB about May 1. Actually, WPB approved the second leg on April 2.

Contractors have been selected for the Houston-Seymour, Ind., section of the 20-in. line with work expected to begin shortly. Eastern half, running from Seymour to New York and one other terminal that has not been definitely selected yet, will be built by the crew constructing the second half of the 24-in. crude pipeline. When work begins on the 20-in. line, construction will go forward simultaneously on both eastern and western sections, PAW said.

PAW Ickes said in announcing WPB approval of the line on April 3 that it is expected it will be completed by the first of next year. Schedule calls for deliveries of 166,000 b/d—70% of the line's capacity—in December, 1943, he said.

All told, PAW said, the "little big inch" will eat up 280,000 tons of new steel, cost $75,000,000 of the government's money, have 84 pumps, and will be "the most dependable method for meeting military and essential civilian requirements for petroleum products during the winter of 1943-44."

Deputy PAW Davies reported simultaneously that survey parties are staking the route of the pipeline between Texas and Little Rock, and the mill will make the first delivery of 20-in. pipe within the next few days.

Richmond Leg of Plantation Line Starts Operations, PAW Says

NPN News Bureau

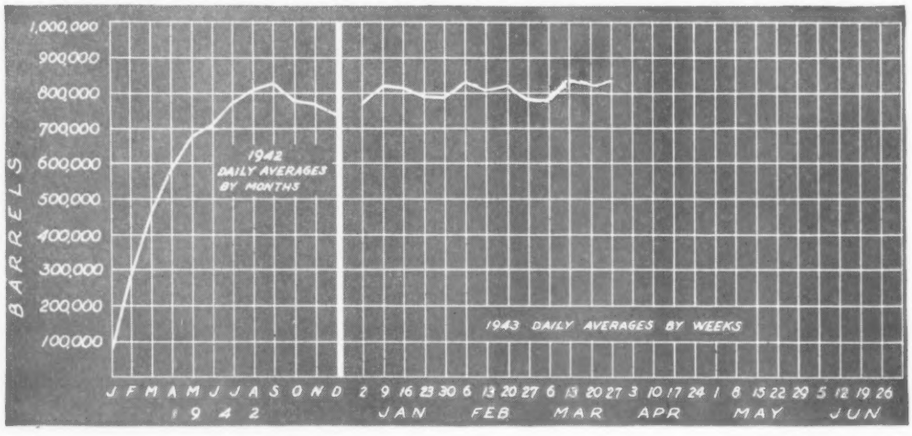
WASHINGTON—The 179-mile Greensboro, N. C.-Richmond, Va. leg of the Plantation pipeline has started operation, PAW Ickes announced April 3.

The head of the line-fill column of 60,000 bbls. of gasoline is expected to reach Richmond about April 13, Mr. Ickes said, at which time barge and tank car shipments to consuming points north of there will commence.

Initial deliveries will total about 15,000 b/d. When additional pumping stations are completed at Roxboro, N. C., and at Clarksville and Blackstone, Va., pipeline deliveries will increase to full capacity of 30,000 b/d.

PAW Deputy Davies said capacity of the Plantation pipeline has recently been increased from 60,000 b/d to 90,000 b/d with installation of 14 booster pump stations. Fed at Baton Rouge by Bayou system and local refinery output, the line, Mr. Davies said, now serves scores of military and industrial centers throughout the Southeast.

Tank Cars Haul 824,657 b/d to Eastern Seaboard



NPN News Bureau

WASHINGTON—Tank car hauls of crude and products to the eastern seaboard averaged 824,657 b/d during week ended Mar. 27 compared with 807,879 b/d the previous week, PAW reported April 2.

Box car hauls of kerosine in drums to New England averaged 21,253 b/d, a drop of 3040 b/d. Total of 44 participating oil companies loaded 26,886 tank cars as follows:

Company	Cars	Company	Cars	Company	Cars
Allied	83	Freedom Oil	4	Shell	895
American Bitumuls	82	Frontier Oil	179	Shotmeyer Bros.	10
Amsco	367	Gulf	2742	Sinclair	1875
Arkansas Fuel Oil	61	Hartol	117	Socony Vacuum	2978
Ashland Refining	58	Hess, Inc.	46	Southland	16
Asiatic Petroleum	56	Home Oil	120	California Standard	34
Atlantic Refining	2382	Pan American	1246	Kentucky Standard	98
Bell Oil & Gas	30	Petrol Corp.	493	New Jersey Standard	5265
James B. Berry Sons	2	Petroleum Heat & Power	166	Sohio	37
Chalmette	10	Phillips	21	Sun	2732
Cities Service	1350	Pioneer Asphalt	4	Talco	19
Conoco	318	Pure	108	Texaco	1236
Crown Central	19	Republic	174	Tide Water	1065
Daugherty	8	Roosevelt	2	White Fuel	113
Elk Refining	34	Royal	70	"Miscellaneous" shipments	161

TODAY . . .

For food to win the war . . . and the peace . . . we depend on the American farmer.

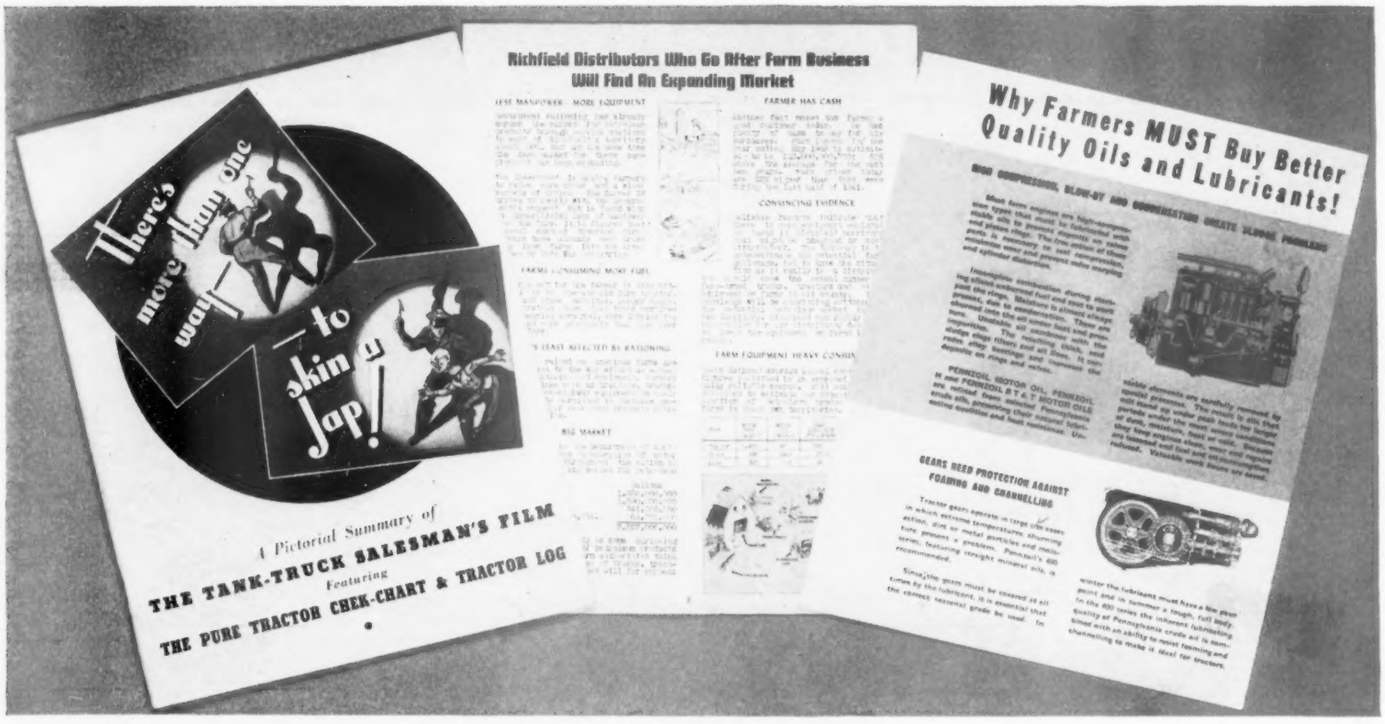
Keeping the farmer's car, his truck and his tractor well lubricated with 100% Pure Pennsylvania Motor Oils is more than just good business right now . . . it's patriotic co-operation.

Because of its high quality, war demands great quantities of 100% Pure Pennsylvania Motor Oils and this demand comes first, of course. So there may not be enough to go around. Our region is producing and refining to the limit of its capacity, but war needs are increasing.

MEMBER OF PENNSYLVANIA GRADE
Guaranteed
100% PURE
PENNSYLVANIA
OIL
CRUDE OIL ASSOCIATION
PERMIT NUMBER .....
Made from
the highest grade crude oil in the world
COPYRIGHT 1937 U S A BY PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION
TRADEMARK REGISTERED U S PATENT OFFICE

PENNSYLVANIA GRADE CRUDE OIL ASSOCIATION

OIL CITY, PENNSYLVANIA


There's more than one way —to skin a Jap!
A Pictorial Summary of
THE TANK-TRUCK SALESMAN'S FILM
Featuring
THE PURE TRACTOR CHEK-CHART & TRACTOR LOG
Richfield Distributors Who Go After Farm Business Will Find An Expanding Market
Why Farmers MUST Buy Better Quality Oils and Lubricants!
GEARS NEED PROTECTION AGAINST FOAMING AND CHANNELLING

Through movie films, house organs, printed literature, advertisements and farm meetings oil companies are prompting salesmen on the sales opportunities of the farm market, with added emphasis this year on the obligation of the oil industry to the farmer and his machinery. At left is a booklet by Pure; center a house organ article on the farm situation in "Richfield Rite-Ups"; right a page from a promotional piece by Pennzoil. Most companies point up the size of the market, telling how farmers are the nation's fair haired boys in the midst of a food crisis, stressing the importance of the oil industry to the farmer's efforts in wartime

SERVING the Farmer in War

Two-Pronged Are Oil Company Farm Programs in 1943. Sales?—Certainly. But Service and Agricultural Achievement Incentives Play a Big Role. Here's a Sampling of Oil Company Farm Programs. . . .

OIL companies with rural outlets are going after the farm business with a double incentive in 1943.

The profit slant is there, yes, but in all the effort being put forth there is also the human, patriotic angle of the nation's need for increased food production in war. Back of the oil companies' 1943 farm program is the theme: soldiers must eat; sailors must eat; the civilian population can hitch its belt a little, but at the same time it can't starve and still turn out the sinews of war so it, too, must eat. Food production must be forced up in spite of manpower and machinery shortages.

Samplings of literature and prepared farm programs of the oil companies reveal heavy marks of sincerity in appeals for increased food production. Perhaps the promotion men were thinking of their own stomachs; or maybe they have sons in Tunisia, New Guinea or England facing a second front. If the literature they have turned out is properly pursued to the end by the sales department and by distributors and tank wagon salesmen, the farmer can surely be influenced to squirt a little more oil on his squeaky tractor, helping it to run easier, last longer, and turn a few more furrows from "Dawn to Dusk", as the Standard of Indiana puts it.

Indiana Standard's farm manual, "Dawn to Dusk"—a part of the company's 1943 farm program—takes the farm tractor and car and truck apart and points out the adjustments and maintenance and repairs the farmer can make himself. This is important since the garage in many cases has gone to war, too.

Lists Helpful Hints

Lubrication comes first in engine operation, "Dawn to Dusk" emphasizes, and specific recommendations of types of oils and greases are given for the different makes of tractors. But the manual has been broadened in interest to the farmer by the inclusion of pointers on belts and pulleys, recipes, quick answers on farm weights and measures, hints for home-made handy tools, etc.

Along with the manual is Indiana Standard's advertising in farm papers, emphasizing that "food production will be a decisive factor in winning the war", and stressing the important place the company's agents hold in America's war effort through their cooperation with farmers.

Indiana Standard's tractor men from company headquarters in Chicago hold clinics with farmers at meetings throughout the Mid-West. Awards of $25 war bonds are made for outstanding agricultural accomplishments to farmers and 4-H club members in the 14 central west states. This year, Indiana Standard will make 155 such awards ,beginning with an April 5 announcement over 100 radio stations and continuing 6 days a week for 6 months. This is twice as many awards as were made last year, the company reports.

Farm Meetings Stressed

Another intensive farm program is that of Pure Oil Co., which is developed in 7 pieces of literature: advertising plans for farm meetings and direct mail; tank truck salesman's tractor handbook; a salesman's conference manual; Chek-Chart on tractor lubrication; tractor log and a readable pamphlet on today's problems of oil jobbers agents and tank truck salesmen.

Pure's pamphlet points out the loss in gallonage due to rationing, and speaks of the farm market as a place to help recoup rationing losses. It also points out the manpower shortage on farms and how this means tractors and trucks must work harder to make up for the lack of help.

Pure stresses farm meetings and proposes making friends with the farmer on a fellowship basis. About 90% of the company's planned farm meetings consist of entertainment

The sooner you know what's happening in Washington

the less it's going to hurt—

SOME day we hope to issue a telegraphic bulletin to our subscribers reading, "All's quiet along the Potomac." But until you receive this telegram you can rest assured that—

In some one or more of the 23 governmental agencies having jurisdiction over the oil industry, someone is cooking up an idea which is going to affect, to a greater or less degree, the way in which you are going to do business tomorrow. So the sooner you know what's going on in the nation's capitol, the less it is going to hurt.

The staff correspondents who man the Oilgram's four national News Bureaus have a knack for smelling out facts and significant happenings which quite often turn out to be presaging shadows of important coming events. They are not prophets but they are specially trained to know an item of oil-war news when they see or hear it. And via the Oilgram this very latest and hottest information is on your desk the next morning.

You probably need this service whether you realize it or not. To help you make up your mind we are willing to send the Oilgram to you for two weeks, free of charge. Mail the coupon today —it won't cost you a dime and it may be the means of saving you, literally, thousands of dollars in the future.

Main Office: 1213 West Third St. CLEVELAND
News Bureaus: Nat. Press Bldg. WASHINGTON
50 West 50th Street NEW YORK
World Building TULSA
59 East Van Buren Street CHICAGO

OILGRAM

SPECIAL NEWS SERVICE

3-month subscription—via first class train mail	$19.50
3-month subscription—via air mail	$21.38
1-year subscription—via first class train mail	$75.00
1-year subscription—via air mail	$82.50

4743

Oilgram News Service,
515 Penton Building, Cleveland, Ohio

Please send me a FREE two-weeks' trial to Oilgram News Service. It is understood that this incurs no obligation, no expense.

Name .....

Company .....

Address .....

City ..... State .....

Platt's

WAR-OIL COMMUNICATION SERVICES

It's Food that Turns the Wheels of War
Keep your Farm in the Fight!
150-HOUR VEEDOL
A Breakdown on the HOMEFRONT means a Letdown on the BATTLEFRONT
DEPEND ON MAGNOLIA LUBRICANTS
MAGNOLIA AGENTS
An Open Letter
TO THE FARMERS OF AMERICA!

Oil company farm advertisements are tieing farm production in with war production: the farm front with the war front. Tide Water Associated, in ad at left, has a farm tractor geared with a trench mortar; Magnolia shows the effect on the war front of a tractor breakdown on the home front; Skelly deplores the lack of praise for America's farmers, heaps some on with an "S" pennant for agricultural achievement

with prizes, reminder gifts and, later, door openers and direct mail follow-up cards.

Skelly Oil Co. points up its farm program this year with agricultural achievement awards and Skelly "S" pennants. In full-page advertisements in mid-western farm journals, in the form of an open letter from President W. G. Skelly, the well-deserved praise of the farmer is sung.

Spurs Farming Achievement

"Defense plant workers in all parts of the United States have been cited for outstanding contributions in the battle of production," Mr. Skelly writes.

"Business, too, has received honorable mention for putting national welfare ahead of private gain.

"But what about the American farmer?"

Skelly Oil Co. knows what about the American farmer. Each week a $100 War Bond and the "S" pennant go to a mid-western farmer, farm wife, farm family, 4-H club member or member of some other farm organization for notable contribution to the war effort. The awards are announced over radio, tied in with a news program. The awards committee, headed by Lloyd Burlington, publisher of *Breeders Gazette*, associate editor of *Hoard's Dairyman* and secretary of the Ayrshire Breeders Assn., is composed of outstanding mid-western agriculturists.

Complimented on Program

Every Saturday night—and this is scheduled to continue throughout 1943—an award is made immediately after the radio announcement by a representative of Mr. Skelly accompanied by a group of county dignitaries. To date, Skelly has received complimentary letters from more than 50 senators, 6 governors, and the heads of 20 agricultural colleges and many outstanding agriculturists.

In Texas and 5 other southwestern states where "Mobilgas", "Mobiloil" and other Socony-Vacuum products are marketed by Magnolia Petroleum Co., the farm and ranch industry is recognized as important, both nationally and internationally.

Right, top: A spread from "Shell Progress", Shell's house organ, shows how this company details for its salesmen the success of others who are finding the farm market profitable. Right, below: A spread from National Refining's farm book, giving information on farm machinery maintenance and helpful hints for the farmer

Left: Sinclair's farm program for salesmen, containing a useful manual to give to the farmer and how to sell him, and Indiana Standard's farm handbook containing everything from how to grease a mowing machine to how to unplug kitchen sinks

Farmers Awakened to Task

In its advertising, Magnolia says: "We know that the farmer and ranchman are confronted with the biggest job they have ever had; that they not only have to feed and clothe the fighting forces, war industry personnel and other civilians at home but abroad as well. In addition to this, they are faced very often with the inability to buy new equipment and it

is therefore necessary to keep the old equipment in tip-top working order."

This importance of the farmer and rancher is tied in closely with the battlefronts in Magnolia's advertising in farm journals through illustrations of farm and war machinery. When the farm tractor is laid up out of order, a Red Cross dog licks the wounds of a fallen soldier. Tractor drivers and aviators are called "partners in victory" in another advertisement. "A lot of fighting is done with a plow", still another headline asserts.

National Refining Company's elaborate 3 color book, The National Farm Book, gives practical advice to farmers on maintenance of farm automotive equipment. It also gives information on petroleum products used on the farm, with other useful information for the entire family.

National also has a program of meetings conducted by company executives which is proving very successful.

Richfield Oil Corp. of New York and Sun Oil Co. push their farm programs through their house organs. Sun's distribution is largely metropolitan, but special, illustrated articles in its house organs detail the success of individual distributors in the farm trade. Richfield cooperates with Ethyl Gasoline Corp. and has distributed 4498 copies of the booklet, "War Time Tractors" and 184 booklets on "High Compression Overhaul and Service".

On request, Richfield supplies its distributors with county farm statistics including the number of farms, tractors, trucks, expenditure for gasoline, distillate, kerosine, etc., and the average expenditure per farm.

Tide Water Associated tells the farmer, through its farm journal advertising: "It's food that turns the wheels of war—Keep your farm in the fight. Beware of wear". "Food fights on all fronts". "Your equipment must not fail". Illustrations tie the farmer closely with the soldier. And the company's farm paper advertising is tied in with its sales program.

So it goes throughout a long list of oil companies whose efforts and money are helping, first, to awaken America's farmers to the magnitude and importance of their function in war, and, second to help the farmer in his actual problems, particularly of keeping his machinery in prime condition.

Delco Executive is Re-Elected Oil-Heat Institute Prexy

NPN News Bureau

NEW YORK—At the annual meeting of Oil-Heat Institute of America held here Mar. 8 and 9, C. E. Lewis of Delco Appliance Division of General Motors Corp. was re-elected president; J. P. Rainbault of the air conditioning and commercial refrigeration department, General Electric Co., was again named vice-president; and C. F. Curtin was reappointed secretary-treasurer. Directors elected for 3 years were R. S. Bohn, Preferred Utilities; G. E. Hochstein, Heil; Stanley Hope, Gilbert and Barker; C. E. Lewis; J. H. Van Sciver, Bethlehem; and a yet-to-be-named representative of S. T. Johnson Co.

New executive committee is composed of Alexis Dostor, Torrington; W. A. Matheson, Oil-O-Matic; M. A. Powers, Timken; W. F. Brannan, Fluid Heat and R. G. Whipple, Harvey-Whipple, in addition to Messrs. Bohn, Van Sciver, Rainbault and Lewis.

★ ★ TO CONSERVE

the Nation's Trucks

Across the length and breadth of America, there are more than 2,200 GMC Service Stations . . . life-saving stations for our vital motor trucks. While General Motors Truck dealers still have new trucks to sell to qualified purchasers, their main job is to keep trucks on the job. They are well equipped to do this for three very good reasons. First, they are truck service specialists. Second, they provide original Preventive Maintenance Service. Third, they are backed by a factory Civilian Truck Service Department having an intimate knowledge of the commercial truck operator's parts and service needs. Make the most of GMC's nationwide service to conserve your trucks for the nation.

Special "Service Payment Plan" available through our own YMAC

Pledged U.S. TRUCK CONSERVATION CORPS

GMC VICTORY MAINTENANCE KEEPS YOUR TRUCK ON THE JOB

INVEST IN VICTORY
BUY WAR BONDS AND STAMPS

THE TRUCK OF VALUE

GMC TRUCKS

★ ★ ★ GASOLINE - DIESEL

EQUIPMENT PERSONALS

Cuyler S. Patton, New York, sales manager of the Alco Products Division of American Locomotive Co., was elected president of the Tubular Exchanger Manufacturers Assn. at the annual meeting held in March in New York. Mr. Patton has been prominent in the association for many years and has served several terms on the executive committee. The association promotes the interests of users and manufacturers of heat exchange equipment and has standardized tubular equipment designs vital to the war.

° ° ° °

Because its engines and compressors are essential in production of explosives, high-octane gasoline and synthetic rubber and ammonia, Clark Bros. Co., Inc., Olean, N. Y. will be awarded the Army-Navy "E" March 27 for excellence in production of these items. The company is a unit of the Dresser Industries.

° ° °

For high achievement in production of war materials, the Koroseal plant at Niagara Falls, N. Y., of B. F. Goodrich Co. has been awarded the Army-Navy "E".

° ° °

For its record in production of chlorine, synthetic ammonia, caustic soda, and other war-essential chemicals, The Niagara Falls plant of Mathieson Alkali Works, Inc., was awarded the Army-Navy "E". Presentation was to **G. W. Dolan,** executive vice-president.

"E" pins were awarded to the plant employes' committee, headed by **Frank A. Sweet,** chairman; to **F. B. Butler,** manager, **George Allinson** and **Jacob Gessner.**

° ° °

Frank N. Smith, formerly adviser on lubrication for industrial plants, oil companies and contractors in the Southwest and in Mexico, has joined The Chek-Chart Corp., Chicago, to devote his time to lubrication programs the company is producing for the U. S. War Department and the Royal Canadian Ordnance Corps.

Mr. Smith, who attended Harvard and Armour Institute, was at one time with The Texas Co. in the Midwest and in Canada, later with the Tide Water Associated Oil at Chicago, and lately with Hibbard Spencer, Bartlett & Co., Chicago, and district sales manager in the Southwest for Freedom Oil Co., Freedom, Pa.

The Huntington Works of the International Nickel Co., Huntington, W. Va., has received its fourth Army-Navy production award.

° ° °

Charles Belknap, St. Louis, chairman of the executive committee and executive vice-president of Monsanto Chemical Co., has been elected president. A 1903 graduate of the U.S. Naval Academy and a veteran of World War 1, Mr. Belknap entered the chemical industry in 1921 as vice-president of Merrimac Chemical Co., Boston. When Merrimac was purchased by Monsanto in 1929, Mr. Belknap became a member of the board of directors and vice-president of Monsanto. He was elected executive vice-president in 1931.

Edgar Monsanto Queeny, for the past 15 years president of the Monsanto Co., was elected chairman of the board, a position which has been vacant since the death in 1933 of his father, John Francis Queeny, founder and first president of the company.

Correction

A photograph used in the Equipment Personals column, NPN, Mar. 31, p. 38, was incorrectly identified as that of **J. C. Markey.** The name under the picture should have been **Frederick R. Cross.** Mr. Cross is the newly appointed general manager in charge of all phases of the lubricating equipment division of the Aro Equipment Co., Bryan, Ohio.

'Gas' Dopes Don't Support Claims Better Business Bureau Says

NPN News Bureau

NEW YORK — "Although the manufacturer and national distributor of Bitaplus gasoline tablets claim that the addition of these tablets to gasoline will effect an increase in mileage up to 30%, tests made by the National Bureau of Standards and by Better Business Bureaus fail to support such contentions," National Better Business Bureau, Inc., reported Mar. 18.

The business bureau quoted the Bureau of Standards, which summed up tests of 150 gasoline dopes offered the public as follows: "Exclusive of well-known knock suppressors, not a single instance of any improvement in any feature of engine performance" was observed.

'Care for Your Year-Older Car', Indiana Standard Ads Urge

NPN News Bureau

CHICAGO—"Care for your year-older car" is to be the theme of Indiana Standard's spring advertising campaign opening Mar. 31 for a period of 3 months.

There are very few new or good used cars available, Standard's campaign announcement said, and present cars are older and gradually wearing out, with parts and repair service more difficult to obtain.

Dramatizing the theme, Standard will advertise "10 Star Wartime Tune-Up", declared a modern version of tune-up campaigns used in previous years. It will go out through radio, newspapers, service station banners, curb signs, window stickers and dealer handout cards.

SPEED UP!

UNLOADING OPERATIONS with BLACKMER · ROTARY · PUMPS

Truck Pumps. Capacities 50-90 GPM. Power take-off, engine or motor drive.

Reduction-geared single or multiple power pumps. Capacities 5 to 750 GPM.

Release trailers, tank cars, and barges faster with these dependable unloading pumps.

CONSERVE YOUR PRESENT PUMPS

To help you our engineers have prepared a special maintenance card. Ask for No. SER-1 — "10 WAYS TO MAKE ROTARY PUMPS LAST LONGER."

HANG A CARD NEAR EACH PUMP.

Write Blackmer Pump Company, 1884 Century Ave. Grand Rapids, Michigan

BLACKMER Rotary PUMPS

"BUCKET DESIGN"—SELF-ADJUSTING FOR WEAR

COMING MEETINGS

APRIL

New Jersey Oil Trade Assn., Inc., Annual Spring Frolic, Robert Treat Hotel, Newark, N. J., Thurs., April 1.

American Assn. of Petroleum Geologists, 28th Annual Meeting. The Hotel Texas, Fort Worth, Texas, Tues.-Wed.-Thurs., April 7-8-9.

American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pa., April 8-9.

Society of Automotive Engineers, New Yorker Hotel, New York, Thurs.-Fri., April 8-9.

National Assn. of Credit Men, Eastern Petroleum Credit Group, War Problem Forum, Ritz-Carlton Hotel, Philadelphia, Pa., Mon.-Tues., April 12-13, 1943.

American Chemical Society, Petroleum Division, Detroit, Mich., Mon.-Fri., April 12-16.

Natural Gasoline Association of America, Baker Hotel, Dallas, Texas, Wed.-Fri., April 14-16.

National Petroleum Assn., Meeting of Trustees and 1 Representative of Each Member Company, Cleveland Hotel, Cleveland, Ohio, Thurs.-Fri., April 15-16.

Montana Oil and Gas Producers Assn., Annual Meeting, Shelby, Mont., County Court House, Tues., April 20.

Independent Oil Men's Assn. of New England, 20th Annual Convention, Copley Plaza Hotel, Boston, Mass., Wed.-Thurs., April 21-22.

The American Society of Mechanical Engineers, Hotel Blackhawk, Davenport, Iowa, Fri.-Sun., April 26-27-28.

American Petroleum Institute, Division of Production, Rice Hotel, Houston, Texas, Thurs.-Fri., April 29-30.

MAY

Petroleum Industry Electrical Assn., Rice Hotel, Houston, Texas, Wed.-Thurs., May 5-6.

Society of Automotive Engineers, Transportation and Maintenance, Pennsylvania Hotel, New York City, Wed.-Thurs., May 5-6.

American Institute of Mining and Metallurgical Engineers, Petroleum Division, Baker Hotel, Dallas, Tex., Thurs., Fri., Sat., May 6, 7, 8, 1943.

Independent Petroleum Assn. of America, Jefferson Hotel, St. Louis, Mo., Fri.-Sat., May 7-8.

National Fire Protection Assn., Palmer House, Chicago, Ill., Mon.-Sat., May 10-11-12-13-14-15.

American Mining Congress, Coal Mine War Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Mon.-Tues., May 17-18.

American Petroleum Institute, Mayo Hotel, Tulsa, Okla., Thurs.-Fri., May 20-21.

JUNE

Society of Automotive Engineers, Diesel Engine and Fuels, Carter Hotel, Cleveland, Ohio, Wed.-Thurs., June 2-3.

The American Society of Mechanical Engineers, Hotel Biltmore, Los Angeles, Calif., Mon.-Wed., June 14-15-16.

American Society for Testing Materials, William Penn Hotel, Pittsburgh, Pa., Mon.-Thurs., June 28-July 1.

OCTOBER

West Virginia Petroleum Assn., Annual Convention Daniel Boone Hotel, Charleston, W. Va., Wed., Oct. 13.

Petroleum Division, National Assn. of Credit Men, St. Louis, Mo., Mon.-Wed., Oct. 25-26-27.

NOVEMBER

The American Society of Mechanical Engineers, New York, Mon.-Fri., Nov. 29-30, Dec. 1-2-3.

DECEMBER

New Mexico Oil & Gas Ass'n., Artesia Hotel, Artesia, New Mexico, Wed., Dec. 1.

Nebraska Petroleum Marketers, Inc., Fontenelle Hotel, Omaha, Tues.-Thurs., Dec. 7-8-9.

TRADEMARKS

The following are trademark applications pertinent to our field pending in the United States Patent Office which have been passed for publication and are in line for early registration unless opposition is filed promptly. For further information address National Trade-Mark Company, Munsey Building, Washington, D. C., trademark specialists.

ALCUT, Ser. 450,119, Sulflo, Inc., Elizabeth, N. J. For metal cutting lubricating compound. Published: Feb. 9, 1943.

KERSOL, Ser. 450,120, Sulflo, Inc., Elizabeth, N. J. For metal cutting lubricating compound. Published: Feb. 9, 1943.

ZERO-CUT, Ser. 450,128, Sulflo, Inc., Elizabeth, N. J. For metal cutting lubricating compound. Published: Feb. 9, 1943.

DESLEX, Ser. 457,376, Union Oil Co., of Calif., Los Angeles. For lubricating oils. Published: Feb. 9, 1943.

This Newly Improved

SEND FOR BULLETIN H-52
IT GIVES FULL DETAILS

OCECO MANHEAD

is Easy to Operate—Non-Sparking—Positively Gas-Tight Closing, and Easily Welded, or Bolted, to the Tank Roof

● Good gas-tight tanks are expensive, and their contents even more so. But tanks are not tight, nor their contents safe, unless the manheads are designed and built to maintain gas-tightness. Specify Oceco Manheads. They have been tested and approved by Underwriters Laboratories, Inc.

Covers of Oceco Manheads are supported loosely from a sturdy malleable iron yoke,—and are provided with a non-sparking composition or white metal ring, set in the cover, that seats tightly against the narrow seating edge of the body. When the cover is closed and the handwheel tightened, pressure is applied through the yoke to the center of the cover and distributed uniformly around the entire seating surface, assuring positive, gas-tight closure,—preventing the loss of any volatiles through the manhead, and the resulting fire hazard. Oceco Manheads are furnished with steel plate flanged bases (ideal for welding to the tank) or drilled for bolting to the tank roof. Standard or "self-closing" construction. Prices and more complete engineering description on request. Send for Bulletin H-52.

OCECO

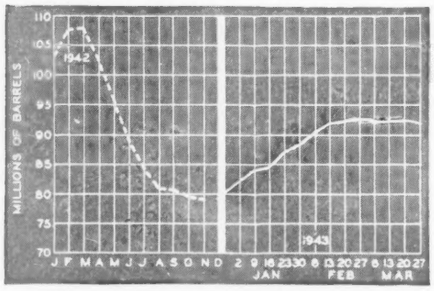
Division of
THE JOHNSTON & JENNINGS COMPANY
883 Addison Road · Cleveland, Ohio
Engineering and Sales Representatives in the Principal Cities

FIRE PREVENTION AND VAPOR CONSERVATION EQUIPMENT
FOR VOLATILE LIQUID STORAGE TANKS

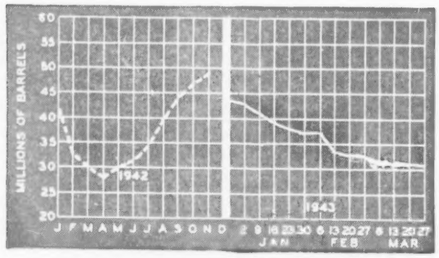
STATISTICS

Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.

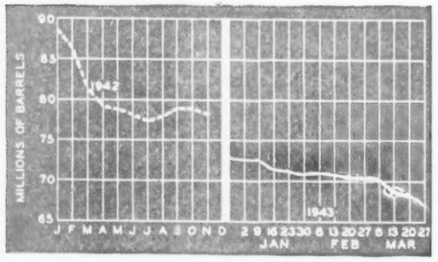
Gasoline Stocks (Finished and Unfinished)



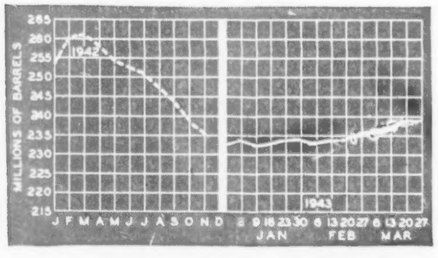
Gas Oil and Distillate Stocks



Residual Fuel Oil Stocks



Crude Stocks



Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

Districts	Daily Potential Refining Capacity Week Ended Mar. 27	Daily Potential Refining Capacity Week Ended Mar. 20	Per Cent of Refining Capacity Reporting Week Ended Mar. 27	Per Cent of Refining Capacity Reporting Week Ended Mar. 20	Daily Average Crude Runs to Stills Week Ended Mar. 27	Daily Average Crude Runs to Stills Week Ended Mar. 20	Per Cent of Reporting Capacity Operated Week Ended Mar. 27	Per Cent of Reporting Capacity Operated Week Ended Mar. 20
Combined**	2,444	2,444	88.7	88.7	1,722	1,643	70.5	67.2
Appalachian	177	177	84.8	84.8	158	147	89.3	83.1
Ind., Ill., Ky.	811	811	85.0	85.0	715	702	88.2	86.6
Okla., Kans., Mo.	416	416	80.1	80.1	340	349	81.7	83.9
Rocky Mt.	147	147	48.0	48.0	85	91	57.8	61.9
California	817	817	89.9	89.9	722	686	88.4	84.0
Total U. S.—B. of M. Basis	4,812	4,812	86.2	86.2	3,742	3,618	77.8	75.2
U. S.—B. of M. Basis Mar. 28, 1942					3,633			

Districts	Gasoline Production at Refineries inc. Natural Blended Week Ended Mar. 27	Gasoline Production at Refineries inc. Natural Blended Week Ended Mar. 20	Stocks of Finished and Unfinished Gasoline Week Ended Mar. 27	Stocks of Finished and Unfinished Gasoline Week Ended Mar. 20	Total Stocks Gas Oil & Distillates Week Ended Mar. 27	Total Stocks Gas Oil & Distillates Week Ended Mar. 20	Total Stocks Residual Fuel Oil Week Ended Mar. 27	Total Stocks Residual Fuel Oil Week Ended Mar. 20
Combined**	4,624	4,588	40,715	40,268	14,127	14,544	10,087	9,929
Appalachian	429	375	2,497	2,721	881	807	447	488
Ind., Ill., Ky.	2,190	2,251	20,786	21,059	3,184	3,464	2,394	2,598
Okla., Kans., Mo.	1,012	1,084	7,314	7,298	1,665	1,665	1,351	1,374
Rocky Mt.	256	281	2,074	2,090	354	356	532	554
California	1,720	1,682	20,693	20,723	10,769	10,888	53,127	53,235
Total U. S.—B. of M. Basis	10,231	10,261	94,079°	94,159	30,980	31,724	67,938	68,178
U. S. — B. of M. Basis Mar. 28, 1942	11,676		107,162		30,659		82,517	

°Finished 83,864,000 bbl.; Unfinished 10,215,000 bbl.
**Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts.

Crude Oil Stocks

(Bureau of Mines figures in thousands of bbls.)

	Mar. 20	Mar. 27	Change from Mar. 20
Pennsylvania Grade	2,816	2,740	— 76
Other Appalachian	1,352	1,307	— 45
Lima-Michigan	1,043	996	— 47
Illinois-Indiana	10,709	10,747	+ 38
Arkansas	2,411	2,457	+ 46
Kansas	8,162	8,372	+210
Louisiana:	12,925	13,260	+335
Northern	4,238	4,379	+141
Gulf Coast	8,687	8,881	+194
Mississippi	1,411	1,272	—139
New Mexico	6,993	7,190	+197
Oklahoma	37,384	37,465	+ 81
Texas:	105,638	105,391	—247
East Texas	24,530	24,659	+129
West Texas	23,970	24,006	+ 36
Gulf Texas	30,417	30,011	—406
Other Texas	26,721	26,715	— 6
Panhandle	5,267	5,345	+ 78
North	7,376	7,365	— 11
South	4,717	4,639	— 78
Other	9,361	9,366	+ 5
Rocky Mountain	13,571	13,553	— 18
California	33,924	34,306	+382
Foreign	78	70	— 8
Total gasoline-bearing in U. S.	238,417	239,126	+709
Heavy in California	10,521	10,839	+318

N. P. N. Gasoline Index

	Dealer T.W. Cents Per Gal.	Tank Car Gal.
April 5	10.57	6.69
Month ago	10.57	6.69
Year ago	10.34	6.49

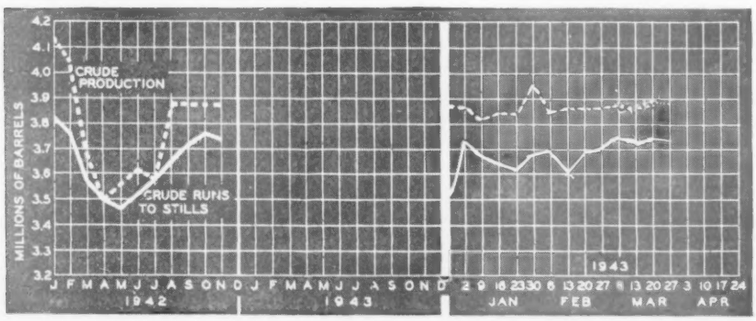
Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

Pennsylvania Crude Runs

(Compiled by National Petroleum Assn. from reports of all companies which refined Pennsylvania crude. Figures in barrels.)

Week Ended	Daily Average	Week Ended	Daily Average
Jan. 2	75,279	Feb. 20	78,797
Jan. 9	70,842	Feb. 27	77,285
Jan. 16	78,155	Mar. 6	70,389
Jan. 23	77,551	Mar. 13	73,184
Jan. 30	74,034	Mar. 20	77,828
Feb. 6	67,494	Mar. 27	82,224
Feb. 13	69,103	1942 Low	67,243
		1942 High	87,251

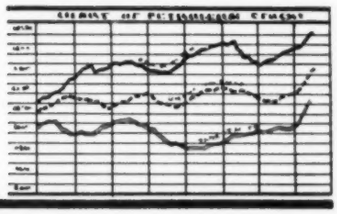

MILLIONS OF BARRELS
CRUDE PRODUCTION
CRUDE RUNS TO STILLS
1942
1943
J F M A M J J A S O N D J F M A M J J A S O N D 2 9 16 23 30 6 13 20 27 6 13 20 27 3 10 17 24
JAN FEB MAR APR

U. S. Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Mar. 27 Barrels (Daily Average)	WEEK ENDED Mar. 20 Barrels (Daily Average)		WEEK ENDED Mar. 27 Barrels (Daily Average)	WEEK ENDED Mar. 20 Barrels (Daily Average)
Oklahoma	345,650	342,450	Eastern (Ill. & Ind. excluded)	93,150	95,350
Kansas	308,900	315,400	Michigan	56,400	55,700
Nebraska	2,150	2,350	Wyoming	91,400	90,050
Texas	1,392,950	1,392,900	Montana	17,800	17,800
Louisiana	339,850	339,550	Colorado	6,700	6,850
Arkansas	70,850	70,800	New Mexico	92,400	92,400
Mississippi	53,700	58,300	California	780,200	780,500
Illinois	228,200	229,500	Total U. S.	3,896,250	3,903,650
Indiana	15,950	13,750			

Oil MARKETS



Pennsylvania

NEW YORK, April 3.—Kerosine and fuel oil were priced higher in the upper field of Western Penna. the past week when one refiner returned to the market after a temporary withdrawal with higher quotations for all grades and others reported higher prices for kerosine. One refiner said he no longer had any No. 2 fuel to offer and withdrew his quotations for that grade. Kerosine, 45 w.w., was up 0.05c at 6.55 to 8.05c; No. 2 fuel, 0.25c at 6.5 to 7.625c; No. 3 fuel, 0.125c at 6.5 to 7.75c; and 36-40 gravity fuel, 0.25c at 6.5c.

In the lower field, one refiner reentered the market with prices 0.25 to 0.3c higher than formerly for kerosine and fuel oil but ranges for all products were unchanged.

Light products continued closely held in both fields under steady demand, although gasoline was said to have "slowed down" under rationing restrictions. Neutral market was said to be showing a much firmer tone also. One refiner reported his neutral position "very good" and said inter-refinery prices had stiffened recently.

Atlantic Coast

NEW YORK, April 3—Higher prices for 72-74 oct. gasoline at Norfolk and Wilmington were reported the week ended April 3, with range highs at those points up 0.2c to 8.9c and 0.05c to 8.8c, respectively. Lows were unchanged at both points at 8.7c, however.

"Desperate" shortages of gasoline at most North Atlantic points were reported by suppliers, and kerosine and fuel oils also continued scarce. Demand for kerosine and light fuel oil was diminishing with approach of warmer weather, trade reported.

Mid-Continent

TULSA, April 3.—Open spot sale of 30,000 bbls. of 72-74 oct. gasoline at "ceiling" price, for shipment over April to East Coast in tank cars on exception to PAO 5, was reported by Texas refiner. Several refiners reported steady increase in call for gasoline and blended lubes from agricultural areas. No let-up in demand for distillate and residual fuel was noted, most refiners said.

Texas refiner reported changes in North Texas quotations from 6.875c to 6.8c for 78 oct. (Ethyl), from 5.875c to 5.8c for 72-74 oct., and from 5c to 4.875c for 60 and below. New prices fell within existing ranges.

Mid-Western

CHICAGO, April 3—Gradual let-up in call for fuel oils and increase in distillate demand for agricultural use was reported by refiners and marketers in Central Michigan and Mid-Western areas last week. They reported only small distillate supplies available.

Gasoline, according to refiners, is in strong demand but marketers said they had not yet felt any great strengthening in this market.

No price changes reported.

Gulf

NEW YORK, April 3.—Sale of 2 cargoes of approximately 90,000 bbls. of residual fuel with API gravity of 18 degrees at $1.09 per bbl. for east coast shipment was reported at the Gulf the past week. Same refiner said he also had sold recently a barge lot of approximately 7000 bbls. of 41-43 w.w. kerosine at 4.125c. Local kerosine demand was said to be "extremely active." Some local gasoline business also was reported.

Range for Bunker "C" fuel ships' bunkers were widened 18c per bbl. when one refiner quoted 25 and above degree material at $1.27 per bbl. Low quotation remained unchanged at 85c for 9.9 and below degree material. One refiner withdrew his quotation for Grade "C" because he lacked any more material.

California

LOS ANGELES, April 3.—California markets are somewhat confused as refiners are in the midst of adjusting price schedules to new OPA ceilings. The price spread on Pacific Spec. 400 fuel oil in ship's bunkers was typical of almost all fuel oil prices. One independent was still quoting 85c while the major companies were quoting $1.10.

The independent gasoline market is firmer. Extreme low of the range is now 5c, 6c, and 6.5c for the 3 grades. This compares with an extreme low 4.5c, 5c, and 5.5c for the 3 grades a week ago.

CRUDE PRICES

Complete tables of crude oil prices are carried in this week's issue of NPN on pages 47 and 48.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

(For orders issued prior to January see earlier issues of NPN)

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Jan. 4, '43—Gasoline tank wagon price increase set for Quincy, Ill.	Jan. 6, p. 11	Jan. 5, p. 1	P. 300.91 P. 272.39
Jan. 4, '43—Residuals and distillates redefined; specific prices set at certain ports	Jan. 6, p. 15	Jan. 4, p. 1	P. 300.93
Jan. 4, '43—Maximum prices set for kerosine, light fuel oils in New York City	Jan. 20, p. 12	Jan. 6, p. 2	P. 300.96 P. 272.40
Jan. 4, '43—Specific prices set for Beverly Hills, Calif. crude	Jan. 13, p. 27	Jan. 6, p. 1	P. 301
Jan. 25, '43—Dollar and cents ceilings set for Western residuals	Jan. 27, p. 15	Jan. 25, p. 2	P. 300.99
Jan. 26, '43—Specific prices set for Pacific heavy fuels	Jan. 27, p. 8	Jan. 26, p. 2	P. 300.103
Jan. 28, '43—Method clarified for setting crude ceilings	Feb. 3, p. 19	Jan. 28, p. 1	P. 300.106
Jan. 28, '43—Crude prices set for certain Texas, Louisiana, Arkansas and Kentucky pools	Feb. 3, p. 20	Jan. 28, p. 1	P. 300.108
Feb. 8, '43—New tank wagon price formula set on basis of reference sellers	Feb. 10, p. 8	Feb. 8, p. 1	P. 300.112
Feb. 12, '43—Ceiling set on Uniontown, Kentucky crude	Feb. 17, p. 20	Feb. 12, p. 1	P. 300.115
Feb. 15, '43—Specific ceilings set on tank wagon prices for Connecticut and New England distillates	Feb. 24, p. 12	Feb. 17, p. 1	P. 300.121 P. 272.49
Feb. 15, '43—Ceiling set for retail sales of distillates in containers at bulk plants in Boston area	Feb. 24, p. 12	Feb. 17, p. 2 Feb. 22, p. 2	P. 300.126
Feb. 16, '43—Tank wagon ceilings set for Michigan distillates	Feb. 24, p. 12	Feb. 16, p. 2	P. 300.117 P. 272.47
Feb. 19, '43—Pricing formula set up for industrial oils and greases	Feb. 24, p. 9	Feb. 18, p. 1	P. 300.129
Feb. 19, '43—Crude sent through Big Inch line exempt from price control	Feb. 24, p. 9	Feb. 23, p. 1	P. 300.136
Feb. 22, '43—Tank wagon increase set for distillates in New York City and vicinity	Mar. 3, p. 12	Feb. 22, p. 1	P. 300.137
Feb. 23, '43—Distillate Diesel ceilings set at 4 Gulf Coast ports	Feb. 24, p. 8	Feb. 23, p. 1	P. 300.135
Feb. 26, '43—Specific distillate ceilings set in Washington, D. C. and Baltimore tank wagon area	Mar. 10, p. 10	Mar. 1, p. 1	P. 300.139 P. 272.52
Feb. 26, '43—Specific ceilings set on Wyoming black crudes	Mar. 3, p. 20	Mar. 1, p. 1	P. 300.142
Mar. 3, '43—New ceilings for residuals and blends set up	Mar. 10, p. 10	Mar. 3, p. 2	P. 300.144

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum News are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices), or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (March 29 to April 5)

	Monday Apr. 5	Friday Apr. 2	Thursday Apr. 1	Wednesday Mar. 31	Tuesday Mar. 30
U. S. Motor, (ASTM octane)					
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7(2)	7(2)	7(2)	7(2)	7(2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.8 – 6	5.8 – 6	5.8 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.4 – 5.5	5.4 – 5.5	5.4 – 5.5	5.4–5.625 (a)	5.4–5.625 (a)
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75(1)	5.75(1)	5.75(1)	5.75(1)
60 octane & above:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	4.875– 5.25	4.875– 5.25	5.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2
New York harbor, barges	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3
Philadelphia district	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75(2)	7.5–7.75(2)	7.5–7.75(2)	7.5–7.75(2)	7.5–7.75(2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	Apr. 5	Mar. 29
OKALHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62, 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7.125
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6 – 7
72-74 oct.	5.8 – 6	5.8 – 6
63-66 oct.	5.4 – 5.5	5.4 – 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375 (1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75 (1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	Apr. 5	Mar. 29
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct. "	5.875 (1)	5.875 (1)
62 oct. "	5.5 (1)	5.5 (1)
60 oct. & below, unleaded	5.375 (1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–7.75 (2)	7.5–7.75 (2)
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 (1)	7.5 (1)
Str. run gasoline, excluding Detroit shpt.	5.5 – 6	5.5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	5.5 – 8.75	5.5 – 8.75
70-75 oct. (regular)	5 – 7.75	5 – 7.75
65 oct. & below (3rd grade)	4.5 – 6.75	4.5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	Apr. 5	Mar. 29
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5	4.5
Range Oil	4 – 4.125	4 – 4.125
No. 1 P.W.	3.875	3.875
No. 1 straw	3.875–4 (1)	3.875–4 (1)
No. 2 straw	3.625	3.625
No. 3 fuel	3.5 (2)	3.5 (2)
U. G. I. Gas Oil	3.625–3.75 (1)	3.625–3.75(1)
No. 6 fuel		
14-16 fuel	$0.97	$0.97
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375	4.375
42-44 grav. w.w.	4.5	4.5
Range Oil	4	4
No. 1 p.w.	3.875 (1)	3.875 (1)
No. 2 straw	3.625	3.625
No. 3	3.5	3.5
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80 (1)	$0.80 (1)
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.25 – 4.75	4.25 – 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	No Price	No Price
KANSAS (For Kansas destinations only)		
41-43 grav. w.w.	No Price	No Price
42-44 grav. w.w.	4.7–4.875 (2)	4.7–4.875 (2)
No. 1 p.w.	4.1–4.25 (2)	4.1–4.25 (2)
No. 6 fuel	$0.85 (1)	$0.85 (1)

REFINERY PRICES (Continued)

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, & Gas Fuel Oil

(Continued)

Prices in Effect	Apr. 5	Mar. 29
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, fer shpt to Ark. points only	5.125 (1	5.125 (1
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.55– 8.05	6.55 – 8.05
46 grav. w.w.	6.675 (1)	6.675 (1)
No. 1 fuel	6.55– 8.05(2)	6.55– 8.05(2)
No. 2 "	6.5 – 7.625	6.5 – 7.625
No. 3 "	6.5 –7.75 (2)	6.5 –7.75(2)
36-40 gravity	6.5 (2)	6.5 (2)
Other districts:		
45 grav. w.w.	6.75 – 6.925	6.5 – 7.925
46 grav. w.w.	6.75 – 6.925	6.5 – 6.925
47 grav. w.w.	6.875– 7.05	6.625– 7.05
No. 1 fuel	6.25 – 6.675	6.25 – 6.675
No. 2 "	6.25 – 7.125	6.25 – 7.125
No. 3 "	6.25 – 7.125	6.25 – 7.125
36-40 grav., Pittsburgh dist. prices excluded	6.25 – 7	6.25 – 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.8 – 6	5.8 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw	5	5
U.G.I. gas oil	4.5 (1)	4.5 (1)
Fuel Oils (Vis. at 100).		
300-500 Vis.	....	....
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	4.5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$1.10 (2)	$0.85 (2)
Light fuel	$1.20(2)	$0.95 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
Los Angeles:		
Heavy fuel	$1.10 (2)	$0.80–$0.85(2)
Light fuel	$1.20 (2)	$0.85–0.95(2)
Diesel fuel	3.5– 4	3.5– 4
Stove dist.	3 – 5 (2)	3 – 5(2)
San Francisco:		
Heavy fuel	$1.15 (1)	$0.90 (1)
Light fuel	$1.25 (1)	$1.00 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals—No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.

0 p.t.	31.5 (1)	31.5 (1)
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	23-26 (b)	23-26 (b)

150 Vis. (143 at 100°) 400-405 fl.

0 p.t.	29.5 (1)	29.5 (1)
10 p.t.	28.5 (1)	28.5 (1)
15 p.t.	27.5 (1)	27.5 (1)
25 p.t.	21-24 (b)	21-24 (b)

(b) Offered by Mid-Western sales agent at 1c off low.

Cylinder Stocks

Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.

10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl.	16	16
630 fl.	17	17

MID-CONTINENT (F. o. b. Tulsa)

Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)

Pale Oils:

Vis.	Color		
60-85	No. 2	8	8
86-110	No. 2	8.5 (2)	8.5 (2)
150	No. 3	14.5	14.5
180	No. 3	15	15
200	No. 3	15	15
250	No. 3	16–16.5	16–16.5
280	No. 3	17	17
300	No. 3	18 (2)	18 (2)

Lubricating Oils (Cont'd)

Prices in Effect	Apr. 5	Mar. 29
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°

200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (1)	22 (1)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

QUALIFYING PRICE NOTE: This note qualifies Mid-Continent Bright and Lube prices herewith. Refiners admit these tables show only their "posted prices" and that they make discounts from these in varying amounts depending on location of buyer and degree of competition of from 2c to 3½c on Bright Stock and upwards of 2c on neutrals. Discounts are made for immediate sale as well as for contracts. Some buyers report these discounts as high as 5c on bright and 3½c on neutrals but have not submitted written evidence.

SOUTH TEXAS Neutral Oils

Vis.	Color		
Pale Oils: (*Vis. at 100°F.*)			
100	No. 1½-2½	6.5	6.5
200	No. 2-3	8.75	8.75
300	No. 2-3	9.25	9.25
500	No. 2½-3½	10	10
750	No. 3-4	10.25	10.25
1200	No. 3-4	10.375	10.375
2000	No. 4	10.5	10.5
Red Oils:			
100	No. 5-6	6.5 (2)	6.5 (2)
200	No. 5-6	8.75	8.75
300	No. 5-6	9.25	9.25
500	No. 5-6	10	10
750	No. 5-6	10.25	10.25
1200	No. 5-6	10.375	10.375
2000	No. 5-6	10.5–11.5	10.5–11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils

Vis.	Color		
60-85	No. 2	9.5 (1)	9.5 (1)
86-110	No. 2	10 (1)	10 (1)
150	No. 3	15.5 (1)	15.5 (1)
180	No. 3	16 (1)	16 (1)
200	No. 3	16 (1)	16 (1)
250	No. 3	17	17
Red Oils:			
180	No. 5	16 (1)	16 (1)
200	No. 5	16 (1)	16 (1)
250	No. 5	17 (1)	17 (1)
280	No. 5	18 (1)	18 (1)
300	No. 5	18.5 (1)	18.5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)

140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)

Bright stocks, 160 vis. at 210 No. 8 color:

0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3

Grade 26-70 ..... 3.875 (Qtns.) 3.875 (Qtns.)

FOB BRECKENRIDGE

Grade 26-70 ..... 3.5 (Qtns.) 3.5 (Qtns.)

CALIFORNIA (FOB plants in Los Angeles basin)

21 pound vapor pressure for blending ..... 4.75 – 5.375 4.75 – 5.375

Naphtha and Solvent

Prices in Effect	Apr. 5	Mar. 29
(FOB Group 3)		
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	8.375– 8.625	8.375– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7 (2)	7 (2)
Stoddard solvent	7 – 7.25	7 – 7.25
OHIO (S. O. quotations for statewide delivery):		
V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25 (2)
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L. FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)

CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)

Fully refined:

122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)		
Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.125	4.375– 5.125
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.5	3.125– 3.5
Red	3 – 3.25	3 – 3.25

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

(Cents Per Gal.)

	Gasoline	Kerosine	*Distillate	Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516		
Decatur, Ill.	2.244	2.244	2.442		
Joliet, Ill.	2.508	2.508	2.516		
Peoria, Ill.	2.310	2.310	2.442		
Quincy, Ill.	2.178	2.178	2.294		
Indianapolis, Ind.	2.640	3.034	3.034		
Evansville, Ind.	2.442	2.886	2.886		
South Bend, Ind.	3.135	3.135	3.330		
Detroit, Mich.	4.290	3.996	3.996		
Grand Rapids, Mich.	3.828	3.828	3.922		
Saginaw, Mich.	4.290	4.144	4.144		
Green Bay, Wis.	2.838	2.838	3.182		
Milwaukee, Wis.	2.706	2.706	2.738		
La Crosse, Wis.	2.574	2.574	2.886		
Minneapolis-St. Paul	2.574	2.574	2.886		
Duluth, Minn.	2.838	2.838	3.256		
Mankato, Minn.	2.574	2.574	2.886		
Des Moines, Ia.	2.046	2.046	2.294		
Davenport, Ia.	2.310	2.310	2.442		
Mason City, Ia.	2.376	2.376	2.664		
St. Louis, Mo.	2.046	2.046	2.072		
Kansas City, Mo.	1.518	1.518	1.776		
St. Joseph, Mo.	1.518	1.518	1.776		
Fargo, N. D.	3.564	3.564	3.996		
Huron, S. D.	3.036	3.036	3.330		
Whichita					
From Ponca City	0.528	0.528	0.592		
From Tulsa	0.858	0.858	0.962		
From Cushing	0.792	0.792	0.888		

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' price and sales shown; bids reported in market leads.

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect Apr. 5

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	....	9.2 – 9.4	9.2(1)
N. Y. Harb., barges	....	9.1 – 9.3	9.1(1)
Albany	....	9.3 – 9.5	....
Philadelphia	....	9.2	....
Baltimore	....	8.95	8.85(1)
Norfolk	....	8.7 – 8.9	8.5(1)
Wilmington, N. C.	....	8.7 – 8.8	8.5(1)
Charleston	....	8.7(2)	8.1(1)
Savannah	....	8.25–8.4(2)	....
Jacksonville	....	8.275(1)	....
Miami	....	....	....
Tampa	....	8.27 – 8.4	8.275(1)
Pensacola	....	7 –7.2(1)	6.6–6.8(1)
Mobile	....	7 – 7.2	6.6–6.8(1)
New Orleans	....	6.125– 6.75	....
Portland	....	9.5 – 9.65	....
Boston	....	9.4 – 9.7	9.7(1)
Providence	....	9.4 – 9.7	....

FUEL OILS

	KEROSINE and/or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	7.1	6.7	6.7	$1.95–$2.01 (a)	$1.65– $2.07
N. Y. Harb., barges	7	6.6	6.6	....	....
Albany	7.3	6.8	6.8(2)	$2.25(1)	$1.85–$2.27 (1)
Philadelphia	7.2	6.7	6.7	$1.98	$1.65–$2.07
Baltimore	7.2	6.7	6.7	....	$1.65– $1.77
Norfolk	7.1	6.7	6.7(1)	....	$1.65– $2.07
Wilmington, N. C.	7.05	6.7	....	....	....
Charleston	7.2	6.7(2)	....	....	$1.65–$2.07 (2)
Savannah	7.05(2)	....	....	....	$1.60–$2.02 (2)
Jacksonville	7.05(1)	6.25	....	....	$1.60–$2.02 (2)
Miami	7.05(1)	....	....	....	$1.60–$2.02 (2)
Tampa	7.05	6.25(2)	....	....	$1.50–$1.92 (1)
Pensacola	4.8 (1)	....	....	....	....
Mobile	4.75–5.05(2)	....	....	....	....
New Orleans	4.25 – 4.75	3.75(2)	....	$1.27(1)	$0.85–$1.27 (2)
Portland	7.3	6.8	6.8(2)	$2.25(1)	$1.65–$2.07 (1)
Boston	7.2	6.7	6.7(2)	$1.95–$2.07 (2)	$1.65–$2.07
Providence	7.2	6.7	6.7(2)	$1.90–$1.95 (2)	$1.65–$2.07

(a) This price is for a straight-run low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65–$2.07	$2.78	6.7–6.8(2)	6.8(2)
Albany	$1.85(1)	$2.98(1)	6.8(1)	7(1)
Philadelphia	$1.65 –$1.77	$2.78	....	....
Baltimore	$1.65 –$2.07	$2.78	6.7(1)	6.7(1)
Norfolk	$1.65 –$2.07	$2.78	6.7(1)	6.7(1)
Charleston	$1.60 –$2.02	$2.78(2)	6.7(1)	6.7(1)
Savannah	$1.60–$2.02 (1)	$2.62(1)	....	....
Jacksonville	$1.60–$2.02 (2)	$2.62(2)	....	....
Tampa	$1.50–$1.92 (2)	$2.62(2)	....	....
New Orleans	$0.97–$1.09	$1.65(1)	4(1)	....
Portland	$1.65–$2.07 (1)	$2.86(2)	6.8(1)	6.9(1)
Boston	$1.65–$2.07	$2.78	6.7(2)	6.8(2)
Providence	$1.65–$2.07	$2.78(2)	6.7(1)	6.8(1)

Residual fuel prices generally vary with A.P.I. specifications from range low for 9.9 & below degrees to range high for 25.0 & above.

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices in Effect	Apr. 5	Mar. 29
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
390 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 oct.	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44 grav. w.w. kero.	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price

In Ship's Bunkers, or deep tank lots:

Diesel Fuel, Pac. Spec. 200	$1.40 –$1.45	$1.40 –$1.45
Grade C fuel, Pac. Spec. 400	$0.825–$0.85	$0.825–$0.85

Cased Goods: (Per case)

375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav., w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices in Effect Apr. 5

	Steel Drums	Bulk
200 Vis. D 210 brt. stock	35 (1)	28.8 (1)
150 vis. D 210 brt. stock 0-10 p.p.	31 (1)	24.8 (1)
10-25 p.p.	....	....
100 vis. D 210 brt. stock 0-10 p.p.	....	....
10-25 p.p.	....	....
200 vis. No. 3 col. neutral: 0-10 p.p.	....	....

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices In Effect Apr. 5

Crude Scale	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow.	4.25 (1)	....	4.25 (1)
122-4 White.	....	4.25 (2)	4.25 (2)
124-6 White.	4.25 (1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permitted on above rate by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

Prices in Effect Apr. 5

	New Orleans & Lower Mississippi to Baton Rouge Tank Cars	New Orleans Barge	Texas Gulf Coast South of New Orleans Tank Cars	Texas Gulf Coast South of New Orleans Barges	CARGOES Domestic & Export From all Gulf Ports
MOTOR GASOLINE					
Leaded (oct. by ASTM)					
80 oct. min. Max. 3 cc lead	6.5 – 7	....	6.75 – 6.9	6.75 – 6.9	6 – 6.9
72-74 oct.	6.125	6.125	5.75	5.75	5.75
63-65 oct.	....	....	5.35	5.35	5.35
Unleaded 70 oct.	....	....	....	....	5.625– 5.75
67-68 oct.	....	....	....	....	5.375– 5.625
65 oct.	....	5.25	....	....	5.25
60 oct.	....	....	....	....	5
KEROSINE & LIGHT FUELS					
41-43 w.w. kero.	3.875– 4.75	4.125– 4.75	4.125– 4.25	4.125	4.125
42-44 w.w. kero.	....	....	4.125	4.125	3.875
No. 2 fuel oil	3.75	3.75	3.75 – 3.81	3.75	4.125
DIESEL & GAS OILS					
(In diesel index No.)					
Below 43 di.	....	....	....	....	3.75
43-47 di.	....	....	....	....	3.875– 4
48-52 di.	4.125	4.125	4	4	3.875– 4
53-57 di.	....	....	4.125	4.125	4
58 and above	....	....	....	....	4.25

Above products in Truck Transports of 2,400 gal. and over ½c above Tank Car Prices.

Naphtha

Prices in Effect Apr. 5

	V.M.&P. Naphtha	Mineral Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

HEAVY FUELS & BUNKER OILS (At all Gulf Ports)	In Cargoes	In Ship's Bunkers (Ex. lighterage)
Heavy Diesels		
Below 28 API Grav.	....	....
28 API Grav. & Above	....	$1.65
Bunker C Oil	$0.85–$1.27	$0.85 –$1.27

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect April 5, 1943 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

	Esso (*Regular Grade*) Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	9.7
*Newark, N. J.	10.2	10.7	4.5	9.7
Annapolis, Md.	10.55	11.05	5.5	11.5
Baltimore, Md.	9.95	10.45	5.5	10.5
Cumberland, Md.	11.35	11.85	5.5	12.0
Washington, D. C.	10.2	10.7	4.5	11.0
Danville, Va.	1.65	12.15	6.5	12.25
Norfolk, Va.	10.45	10.95	6.5	12
Petersburg, Va.	10.75	11.25	6.5	13
Richmond, Va.	10.75	11.25	6.5	13
Roanoke, Va.	11.95	12.45	6.5	12.5
Charleston, W. Va.	12.25	12.75	6.5	13.3
Parkersburg, W. Va.	11.55	12.05	6.5	13
Wheeling, W. Va.	11.55	12.05	6.5	13.6
Charlotte, N. C.	12.1	12.6	7.5	11.3
Hickory, N. C.	12.65	13.15	7.5	12.3
Mt. Airy, N. C.	12.5	13.0	7.5	11.5
Raleigh, N. C.	11.85	12.35	7.5	12.3
Salisbury, N. C.	12.15	12.65	7.5	12.7
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	9.7	9	9
Newark	9.7	9	9
Annapolis, Md.	....	9.25	...
Baltimore	9.5	9	9
Washington, D. C.	10	9.4	9.4
Norfolk, Va.	9.7	8.8	8.8
Petersburg	10	9	...
Richmond	10	9	9
Charlotte, N. C.	10.3	10.4	...
Hickory, N. C.	....	10	....
Raleigh	11.3	10.1	...
Charleston, S. C.	....	9	....
Columbia	....	10	....
Spartanburg	....	10.8	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

New York City	Com. Cons. T.W.	Indiv. Dlr. T.W.	Gasoline Taxes
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kerosine Yard	TW	Mobilfuel Diesel TC	TW	Mobilheat Fuel Yard	TW
New York:						
Manhat'n & Bronx	7.5	10.3	...	9.3	7.1	9
Kings & Queens	7.5	10.3	...	9.3	7.1	9
Richmond	7.5	10.3	...	...	7.1	8.8
Albany	7.5	9.8	7	9.3	7	9
Binghamton	8.9	11.2	...	10.7	8.4	10.2
Buffalo	8.6	10.9	8	10.3	8.2	10
Jamestown	8.7	11	...	10.6	8.3	10
Mt. Vernon	7.6	10.3	...	9.4	7.2	9
Plattsburg	8.1	10.4	...	9.9	7.6	9.4
Rochester	8.7	11	7.9	10.2	7.9	9.7
Syracuse	8.5	10.8	7.8	10.1	7.8	9.6
Conn.:						
Bridgeport	7.8	10.3	...	...	7.2	8.8
Danbury	8.2	10.8	...	...	7.5	8.8
Hartford	7.8	10.3	...	9.5	7.2	9
New Haven	7.8	10.3	...	9.3	7	8.9
Maine:						
Bangor	7.9	10.2	7.4	9.7	7.4	9.1
Portland	7.5	10.2	7	9.3	7	9
Mass.:						
Boston	7.8	10.6	6.9	9.2	7.1	9
N. H.:						
Concord	8.4	10.7	...	...	8.2	10
Lancaster	9.5	11.8	...	...	9.2	11
Manchester	8.5	11.1	...	...	7.9	9.7
R. I.:						
Providence	7.6	9.9	6.9	9.2	7.1	8.9
Vermont:						
Burlington	8.1	10.4	7.5	9.8	7.5	9.2
Rutland	8.3	10.6	...	10	7.7	9.5

*Does not include 1% city sales tax applicable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)

	Commercial T.W.	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	12.25
Pittsburgh	10.7	11.2	5.5	12.6
Allentown	10.7	11.2	5.5	12.6
Erie	10.7	11.2	5.5	12.6
Scranton	10.7	11.2	5.5	12.6
Altoona	10.7	11.2	5.5	12.6
Emporium	10.7	11.2	5.5	12.6
Indiana	10.7	11.2	5.5	12.6
Uniontown	10.7	11.2	5.5	12.6
Harrisburg	10.7	11.2	5.5	12.6
Williamsport	10.7	11.2	5.5	12.6
Dover, Del.	....	11.2	5.5	12.6
Wilmington, Del.	....	10.7	5.5	12.1
Boston, Mass.	....	10.9	4.5	....
Springfield, Mass.	....	11.8	4.5	....
Worcester, Mass.	....	11.5	4.5	....
Fall River, Mass.	....	11	4.5	....
Hartford, Conn.	....	11.6	4.5	....
New Haven, Conn.	....	11	4.5	....
Providence, R. I.	....	11	4.5	....
Atlantic City, N. J.	....	10.7	4.5	10
Camden, N. J.	....	10.7	4.5	10
Trenton, N. J.	....	10.7	4.5	10
Annapolis, Md.	....	11.05	5.5	10.8
Baltimore, Md.	....	10.45	5.5	9.8
Hagerstown, Md.	....	11.55	5.5	10.3
Richmond, Va.	....	11.25	6.5	12.3
Wilmington, N. C.	....	11.55	7.5	11.9
Brunswick, Ga.	....	10.4	7.5	‡11.1
Jacksonville, Fla.	....	10.4	8.5	12.1

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	6
Phila., Pa.	10.1	9	9	5.76	5.33*
Allentown, Pa.	10.6	9.3	9.3	....	....
Wilmington, Del.	10.1	9	9	....	....
Springfield, Mass.	10.2	9.4	9.4	....	....
Worcester, Mass.	10.2	9.3	9.3	....	....
Hartford, Conn.	10	9	9	....	....

‡Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

*Residual fuel 16.0-19.9 gravity.

S. O. Ohio††

*Sohio X-70 Gasoline (*Regular Grade*)

	Consumer T.W.	**Reselers	‡S.S. Taxes	Gasoline Taxes	†Kerosine T.W.
Ohio, Statewide	12	10	13.5	5.5	9.3
Akron	12	9.5	12.5	5.5	9.3
Cincinnati	12	9.5	12.5	5.5	9.3
Cleveland	12	9.5	12.5	5.5	9.3
Columbus	12	9.5	12.5	5.5	9.3
Dayton	12	9.5	12.5	5.5	9.3
Marietta	12	9.5	12.5	5.5	9.3
Portsmouth	12	9.5	12.5	5.5	9.3
Toledo	12	9.5	12.5	5.5	9.3
Youngstown	12	9.5	12.5	5.5	9.3

Aviation Gasoline—Statewide

	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 87 Oct.(a)	17.5	5.5
Esso Ethyl Aviation 87 Oct.(a)	17.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

(a) Effective Oct. 15, 1942.

	†Naphtha—T.W. Statewide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8.3	8.3	7.8	....
Cleveland	10.3	10.3	9.8	7.55

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos. 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price, 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals. or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Crown	Dealer Standard	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	9.5	8.5	6.5	9.25
Lexington, Ky.	10.5	8.5	6.5	9.25
Louisville, Ky.	10	9	6.5	8.75
Paducah, Ky.	10	8	6.5	8.75
Jackson, Miss.	10	9	7.5	*9
Vicksburg, Miss.	9.5	8.5	7.5	*8.5
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	10
Atlanta, Ga.	11.4	..	7.5	*11.8
Augusta, Ga.	11.4	....	7.5	*11.3
Macon, Ga.	11.4	....	7.5	11.8
Savannah, Ga.	10.4	....	7.5	*10.8
Jacksonville, Fla.	10.4	....	8.5	9.8
Miami, Fla.	10.4	....	8.5	9.8
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	10.4	....	8.5	9.8

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax, Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	10.9	8.9	8.4	4.5	10.6
Decatur, Ill.	10	8.5	8	4.5	9.8
Joliet, Ill.	11.9	9.6	8.5	4.5	10.6

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c, Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect April 5, 1943 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Blue	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	11.7	9.2	9.1	4.5	10.4
Indianapolis, Ind	11.6	9.7	9.6	5.5	*10.1
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.9
South Bend, Ind	12	10.5	10	5.5	*10.5
Detroit, Mich.	11.4	9.9	9.4	4.5	10
Grand Rapids, Mich	10.8	9.3	8.8	4.5	9.9
Saginaw, Mich	11.4	9.9	9.4	4.5	9.9
Green Bay, Wis	12.2	10.7	10.2	5.5	10.9
Milwaukee, Wis	12.1	10.6	10.1	5.5	10.8
La Crosse, Wis	11.9	10.4	9.9	5.5	10.6
Minneapolis-St. Paul	11.9	10.4	9.5	5.5	10.6
Duluth, Minn	12.2	10.7	10.2	5.5	10.9
Mankato, Minn	11.9	10.4	9.5	5.5	10.6
Des Moines, Ia.	11.4	9.9	9.4	4.5	*10.1
Mason City, Ia	11.7	10.2	9.7	4.5	*10.4
St. Louis, Mo	10.3	8.8	8.6	*4.5	10.1
Kansas City, Mo	10.4	8.9	7.9	*4.5	9.7
St. Joseph, Mo	11.2	9.7	8.7	*4.5	9.7
Fargo, N. D.	12.9	11.4	10.5	5.5	11.6
Huron, S. D.	12.3	10.8	10.3	5.5	11
Wichita, Kans	9.7	8.2	6.5	4.5	8.3

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7	4.5
Milwaukee, Wis.	15.9	5.5
Minneapolis, Minn	15.7	5.5
St. Louis, Mo	15.2	*4.5
Kansas City, Mo	14.8	*4.5
Fargo, N. D.	16.7	5.5
Huron, S. D.	16.1	5.5

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
	(Prices are base prices before discounts)			
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo	13.3	14.3	13.8	1.5
St. Louis, Mo	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'ls	14.2	15.2	13.5	5.5

Fuel Oils T.W.

Chicago	Standard Heater Oil
1-99 gals.	9.3
100-149 gals.	8.3
150 gals. & over	7.8

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.8	8.8
100-149 gals.	7.8	7.8
150-399 gals.	7.8	7.8
400 gals. & over	7.3	7.3

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals.	8.3	8.3
100-399 gals.	7.3	7.3
400-749 gals.	6.3	6.3
750 gals. & over	5.55	5.55

	Stanolex Bunker C Fuel Oil
1-399 gals.	6.8
400-999 gals.	5.8
1000 gals. & over	4.8

Other Points	Stanolex No. 1	Stanolex Furnace Oil
Indianapolis		
1-99 gals.		*9.0
100 gals. & over		*8.0
Detroit		
1-99 gals.		8.1
100 gals. & over		7.1
Milwaukee		
1-99 gals.		9.0
100 gals. & over		8.0
Minneapolis		
1-99 gals.		8.8
100 gals. & over		7.8
St. Louis		
1-99 gals.	8.6	8.1
100 gals. & over	7.6	7.1
Kansas City		
1-99 gals.		7.9
100 gals. & over		6.9

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 1c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

State sales, occupation, consumer and use taxes to be added when applicable.

S. O. Nebraska

(*Regular Grade*)

	T.W. Dealer	Gasoline Taxes	Kerosine T.W.
Omaha	11.4 8.9	6.5	10.1
McCook	10.5 9.4	6.5	9.3
Norfolk	11.9 10.4	6.5	10.6
North Platte	11 9.9	6.5	10.3
Scottsbluff	12.4 9.5	6.5	9.8

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La	8.75	9.25	8.5	*9
Baton Rouge, La	8.75	9.25	8.5	*9.5
Alexandria, La	8.75	9.25	8.5	*9.5
Lafayette, La	9	9.5	8.5	*9
Lake Charles, La	9	9.5	8.5	*11
Shreveport, La	8.5	9	8.5	*8
Knoxville, Tenn	9.5	10	8.5	12.5
Memphis, Tenn	8.90	9.40	8.5	10.5
Chattanooga, Tenn	10.5	11	8.5	11
Nashville, Tenn	10.5	11	8.5	10
Bristol, Tenn	10.95	11.45	8.5	13.1
Little Rock, Ark	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax.

Discounts:

Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Re-tail	Thriftane *Tank Wagon	Re-tail	Gasoline Taxes
Dallas, Tex.	6.5	9.5	5.5	7.5	5.5
Ft. Worth, Tex.	6.5	10.5	6	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Retail
Dallas, Tex.	7	11
Ft. Worth, Tex	7	11
Houston, Tex	8	11
San Antonio, Tex.		10
73 Oct. Aviation Gasoline		Tank Car
FOB Baytown, Tex.		8.5

*To all classes of dealers & consumers.

The Texas Co.

	Gasoline—Dealer T.W. Fire-Chief (*Regular*)	Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	6.5	5.5	5.5
Ft. Worth, Tex.	6.5	6.0	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition).

	Conoco Bronz-z-z (*Regular*) †Tank Wagon	Demand (*3rd Grade*)	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	10	9	*7	9.5
Roswell, N. M.	9.5	8.5	*7	9
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.

†To consumers & dealers.

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Posted Re-tail	Flight Posted Net Tank Truck	Posted Re-tail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.5
Seattle, Wash.	13	6.5	13.5
Spokane, Wash.	13	6.5	16.5
Tacoma, Wash.	13	6.5	13.5

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.

Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 1c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.

†To divided & undivided dealers.

Tank Wagon Price Changes

(These changes have been made in price tables)

S.O. Ohio—reported a hike of 0.3c for kerosine at all points, effective March 17.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:

Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.

Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

CRUDE OIL PRICES

Prices in $ per bbl. of 42. U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

EASTERN & CENTRAL STATES FIELDS

PENNSYLVANIA GRADE

Posted by Jos. Seep Purch. Agency (Mar. 26, '42)

Bradford-Allegany $3.00
Southwest Penna. $2.65
Eureka (West Va.) $2.59
Corning, O. (May 27, '41) $1.31

Posted by The Pennzoil Co. (Mar. 26, '41)

National Transit $2.93*

Posted by Valvoline Pipe Lines (Mar. 26, '42)

Bradford (Elk & McKean Counties, Pa.) $3.00
Warren, Forest, Venango, Clarion & Butler Counties, Pa. $2.93
Alleghany, Beaver, Washington & Greene Counties, Pa. $2.65
West Virginia $2.59
Southeastern Ohio $2.55

*Applies to Cochran, Franklin, Hamilton & Doolittle districts; prices in other lower districts range down to $2.68 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co. (May 27, '41)

Midland, Midland County $1.44
Sherman $1.39

Posted by Simrall Corp. May 27, '41

Greendale, Porter, Vernon, Crystal & Wise $1.44
Buckeye, Bentley, Edenville, Beaverton & Monitor (sweet crude type) $1.42
Freeman, Redding, Lincoln & Winterfield $1.39
West Branch-Arenac $1.24
Hamilton-Grout $1.29

Sept. 1, '42

Fork Twp.-Mecosta Co. $1.39

Posted by Sohio Corp. (Mich. Div.)

Traverse crude in Allegan, Kent, Ottawa & Van Buren Cos. (June 2, '41) $1.45
Trenton crude, Monroe Co. (June 2, '41) $1.39

Posted by Bay Pipe Line Corp. (May 27, '41)

Saginaw & Wise $1 44
Buckeye, Bentley & Kawkawlin $1.42
Clare $1.11
Adams (June 1, '41) $1.27

ILLINOIS-INDIANA-KENTUCKY-OHIO

Posted by Sohio Corp. (May 21, '41)

Illinois Basin*, including Griffin pool $1.37
Carmi, Storms, Ill. area $1.32
Birk City, Ky. area $1.32

Posted by Ohio Oil Co. (May 21, '41)

Illinois Basin $1.37
Eastern Ill. & Western Ind. $1.22

Posted by Carter Oil Co. (May 21, '41)

Loudon, Fayette Co. Ill. $1.37

Posted by Mohawk Oil Lines, Inc. (May 21, '41)

Southern Illinois $1.37

Posted by Ashland Oil & Transp. Co.

Somerset oil in Ash. Lines, Ky.: (June 19, '41)
Big Sandy River $1.38
Kentucky River $1.43

Posted by Owensboro-Ashland Co.

Owensboro, Ky. area (May 21, '41) $1.32

Posted by S. O. Ohio (Sept. 1, '41)

Lima, Ohio $1.50
Cleveland, Lodi & Chatham (O.) areas $1.30

*Also posted by The Texas Co.

MID-CONTINENT

OKLAHOMA-KANSAS-NORTH TEXAS

(See below for companies posting and dates)

Gravity	Schedule No. 1	Schedule No. 2	Schedule No. 3
Below 21	$0.85	$0.75	$0.81
21-21.9	.87	.78	.83
22-22.9	.89	.81	.85
23-23.9	.91	.84	.87
24-24.9	.93	.87	.89
25-25.9	.95	.90	.91
26-26.9	.97	.93	.93
27-27.9	.99	.96	.95
28-28.9	1.01	.99	.97
29-29.9	1.03	1.02	.99
30-30.9	1.05	1.05	1.01
31-31.9	1.07	1.07	1.03
32-32.9	1.09	1.09	1.05
33-33.9	1.11	1.11	1.07
34-34.9	1.13	1.13	1.09
35-35.9	1.15	1.15	1.11
36-36.9	1.17	1.17	1.13
37-37.9	1.19	1.19	1.15
38-38.9	1.21	1.21	1.17
39-39.9	1.23	1.23	1.19
40 & above	1.25	1.25	1.21

Above schedules posted by:

No. 1: **S. O. Indiana** May 20, '41 in Okla. & Kans. **Sinclair-Prairie** May 20, '41 in Okla. & Kans. beginning with 25-25.9. **Continental** May 19, '41 in Okla. & Kans. beginning with Below 29 at $1.01. **Texaco** May 19, in Okla. & Kans. beginning with 28-28.9.

No. 2: **Carter** Nov. 1, '42 in Okla. & Kans., **Shell** Dec. 5, '41 in Okla. & Kans. **Magnolia** May 21, '41 in Okla.

No. 3: All Dec. 11, '41: **Stanolind & Continental** in N. Tex. **Sinclair-Prairie** in N. Central Tex. **Magnolia & Texaco** in N. & N. Central Tex. **Continental, Magnolia & Sinclair-Prairie** schedules begin with Below 29 at $0.97. **Texaco** schedule begins with 28-28.9.

TEXAS & NEW MEXICO FIELDS

Posted by Humble Oil & Refining Co.

(May 21, '41, except Panhandle, Tex. July 9, '41 and W. Central Texas Dec. 11, '41)

Gravity	Refugio	Texas Gulf Coast	Miran-do	Ana-huac	Dick-inson	East Central Texas	West Central Texas	Pan-handle, Texas	W. Texas & New Mex.	Hawkins Texas
Below 20	$1.08	$1.06	$1.03	$0.98	$0.93	....	....	$0.73	$0.70	$0.80
20-20.9	1.10	1.08	1.05	1.00	.95	....	....	.75	.72	.82
21-21.9	1.12	1.10	1.07	1.02	.97	....	....	.77	.74	.84
22-22.9	1.14	1.12	1.09	1.04	.99	....	....	.79	.76	.86
23-23.9	1.16	1.14	1.11	1.06	1.01	....	....	.81	.78	.88
24-24.9	1.18	1.16	1.13	1.08	1.03	....	....	.83	.80	.90
25 & above	....	....	....	....	....	....	....	....	....	.92
25-25.9	1.20	1.18	1.15	1.10	1.05	$0.97	$0.91	.85	.82	....
26-26.9	1.22	1.20	1.17	1.12	1.07	.99	.93	.87	.84	....
27-27.9	1.24	1.22	1.19	1.14	1.09	1.01	.95	.89	.86	....
28-28.9	1.26	1.24	1.21	1.16	1.11	1.03	.97	.91	.88	....
29-29.9	1.28	1.26	1.23	1.18	1.13	1.05	.99	.93	.90	....
30-30.9	1.30	1.28	1.25	1.20	1.15	1.07	1.01	.95	.92	....
31-31.9	1.32	1.30	1.27	1.22	1.17	1.09	1.03	.97	.94	....
32-32.9	1.34	1.32	1.29	1.24	1.19	1.11	1.05	.99	.96	....
33-33.9	1.36	1.34	1.31	1.26	1.21	1.13	1.07	1.01	.98	....
34-34.9	1.38	1.36	1.33	1.28	1.23	1.15	1.09	1.03	1.00	....
35-35.9	1.40	1.38	1.35	1.30	1.25	1.17	1.11	1.05	1.02	....
36-36.9	1.42	1.40	1.37	1.32	1.27	1.19	1.13	1.07	1.04	....
37-37.9	1.44	1.42	1.39	1.34	1.29	1.21	1.15	1.09	1.06	....
38-38.9	1.46	1.44	1.41	1.36	1.31	1.23	1.17	1.11	1.08	....
39-39.9	1.48	1.46	1.43	1.38	1.33	1.25	1.19	1.13	1.10	....
40 & above	1.50	1.48	1.45	1.40	1.35	1.27	1.21	1.15	1.12	....

Refugio: Includes crude purchased in East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth, Saxet, Taft, & Tom O'Connor fields.

Texas Gulf Coast: Includes crude purchased in Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa, Mykawa New, Raccoon Bend, South Thompsons, Sugarland, Thompsons, & Webster fields.

Mirando: Includes crude purchased in Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North & South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manilla, Mirando Valley, Placedo, Randado, Sarnosa, & Tesoro fields.

Anahuac: Includes crude purchased in Anahuac, Angleton, Cedar Point, Fisher Reef, Hull, (Old & New), Pierce Junction, Red Fish Reef, & Turtle Bay fields.

Dickinson: Includes crude purchased in Dickinson, Gillock, Hardin, League City, & Rowen fields.

East Central Texas: Includes crude purchased in Anderson, Cherokee, Limestone, & Navarro Counties, and Navarro Crossing field.

West Central Texas: Includes crude purchased in Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, & Throckmorton Counties.

Panhandle, Texas: Includes crude purchased in Carson, Gray Hutchinson & Wheeler Counties.

West Texas & New Mexico: Includes crude purchased in Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard Reagan, Upton, Winkler, & Yoakum Counties, Texas; Lea County, M. N.

Hawkins: Includes crude purchased in Hawkins Field, Wood County, Texas.

Conroe $1.43
Tomball 1.40
Van 1.08
Talco 0.79
East Texas & Flag Lake $1.25
Flour Bluff, E. Flour Bluff 1.33
Salt Flat, N. Salt Flat 1.14
Darst Creek, Hilbig, Carroll 1.14
Clark, Zoboroski $1.14
Alice, Benavides (N. Sweden), Sun 1.35
Ben Bolt, Clark-Muil, Tom Graham 1.35
Yates (Pecos) 0.95
La Rosa 1.33

MAGNOLIA PETROLEUM CO.

(May 21, '41)

Panhandle, Tex.—(July 9, '41)—Same as Humble except Magnolia begins with below 29 at $0.91.

West Texas—In Crane, Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum & Gaines Cos., and in Pecos & Andrews Cos. beginning Apr. 1, '42—Same as Humble except Magnolia begins with Below 25 at $0.80.

N. Mexico—In Lea Co.—Same as Humble except Magnolia begins with Below 25 at $0.80 & ends with 36 & above at $1.04.

Cass & Panola Cos., Tex.—Below 25 at $0.88, plus 2c per degree of gravity to 40 & above at $1.20.

Mirando, Tex.—Same as Humble.

East Texas $1.25
Darst Creek 1.14
Luling 1.05
Talco ..... .79
Lytton Springs $1.17
Cleveland-Liberty Co. 1.26
Tomball 1.40

SINCLAIR-PRAIRIE OIL MARKETING CO.

West Texas & New Mexico—(May 30, '41)—Same as Humble except Sinclair-Prairie begins with Below 25 at $0.80.

Texas Gulf Coast—(May 21, '41)—Same as Humble.

Mexia District, Texas—(May 30, '41)—Same as Humble, East Central Texas, except Sinclair-Prairie also posts Below 25 at $0.95.

East Texas—(May 21, '41) $1.25

Long Lake, Texas—(May 21, '41) $1.23

Chapel Hill (Washington Co.) Tex.:
Below 50 grav. (Jan 20, '42) $1.18
50 grav. & above (Feb. 2, '42) $1.25

Mirando, Tex.—(Nov. 1, '42)—Same as Humble.

Wade City & Clara Driscoll, Tex.—(Jan. 1, '43)—Same as Humble Refugio.

Alfred & Magnolia City, Tex.—(Nov. 1, '42), $1.35

STANOLIND OIL PURCHASING CO.

(May 21, '41)

Clinton, Tex.—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

Fairbanks, N. Houston & Rosslyn, Tex.—Same as Humble Dickinson schedule.

Lake Creek, Tex.—(Apr. 9, '42)—Same as Humble Tex. Gulf Coast except Stanolind begins with Below 21 at $1.08.

E. Texas $1.25
Satsuma & Tomball, Tex. $1.40
Eureka Heights (Harris Co.)—Aug 1, '42 ..... $1.15
W. Beaumont (Mar. 1, '42)—Same as Humble Tex. Gulf Coast.

Trinity (Kittrell) Field (Oct. 1, '42)—Same as Humble Tex. Gulf Coast.

Dyersdale Field (Nov. 1, '42)—Same as Humble Tex. Gulf Coast.

STANOLIND OIL & GAS CO.

(May 21, '41)

Spindletop (Jefferson Co., Tex.) **& High Island** (Galveston Co., Tex.)—Same as Humble Tex. Gulf Coast.

Hendrick & Henderson (Winkler Co., Tex.)—Same as Humble West Texas except Stanolind begins with Below 26 at $0.82.

Jay Welder (Calhoun Co., Tex.)—Nov 14, '41—Same as Humble Anahuac.

Spencer & Pyote (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas.

Magnolia Sealey South (Ward Co., Tex.)—June 8, '42—Same as Humble W. Texas except Stanolind ends with 36 & above at $1.04.

THE TEXAS CO.

(May 21, '41)

Panhandle, Tex.—Same as Humble except Texaco begins with 34-34.9 at $1.03.

W. Texas & Lea Co., N. M.—Same as Humble except Texaco posts $0.78 for 23.9 & below and ends with 36 & above at $1.04.

Texas Gulf Coast—Same as Humble except Texaco ends with 34 & above at $1.36.

Duval, Mirando, Tex.—Same as Humble Mirando except Texaco ends with 28-28.9 at $1.21.

Refugio, Tex.—Same as Humble except Texaco ends with 28-28.9 at $1.26.

East Texas $1.25
Darst Creek, Tex. $1.14
Conroe, Tex. $1.43
Hockley & Cochran Cos., Tex. ..... .87

SHELL OIL CO., INC.

(May 20, '41)

West Texas & Lea Co., N. M.—Same as Humble except Shell ends with 36 & above at $1.04. Also includes Ward Co., Tex.

Fisher Co., Tex.—(Dec. 11, '41)—Same as Humble W. Central Texas except Shell begins with Below 25 at $0.89.

East Texas $1.25
Livingston field, Polk Co., Tex. $1.25
Pecos Co., Texas, (except Yates Shallow Pool) ..... .95
Pecos Co., Tex., Yates Shallow Pool ..... .82
Mercy field, San Jacinto Co., Tex. (Feb. 18, '42) 1.25

CONTINENTAL OIL CO.

Carson & Hutchinson Cos., Tex.—(July 9, '41)—Same as Humble Panhandle except Continental begins with Below 29 at $0.91.

Eddy Co., N.M.—(May 30, '41)—Same as Humble N. M. schedule except Continental begins with Below 29 at $0.88.

PAN AMERICAN PRODUCTION CO.

(May 21, '41)

Hastings & S. Houston, Tex.—Same as Humble Tex. Gulf Coast except Pan Am. begins with Below 21 at $1.08.

Gillock, Tex.—Same as Humble Dickinson except Pan Am. begins with Below 21 at $0.95.

East Texas $1.25
Cayuga, Tex. ..... .90
Goodrich, Tex. (Dec. 1, '41) 1.20

CRUDE OIL PRICES

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates shown.

CALIFORNIA

Posted by S. O. California, April 1, 1943

(All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Colea Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Gravity
14-14.9	....	$ .93	....	....	$0.96	$1.01	$0.95	....	$ .95	$0.95	$0.95	$0.97	....	....	....	....	....	$0.98	$0.98	$0.98	14-14.9
15-15.9	....	.96	....	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	....	.98	.98	.98	15-15.9
16-16.9	....	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	....	.98	.98	.98	16-16.9
17-17.9	....	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	....	.98	.98	.98	17-17.9
18-18.9	$0.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	....	.98	.98	.98	18-18.9
19-19.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	$ .98	.98	.98	.98	19-19.9
20-20.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	.98	20-20.9
21-21.9	.93	.96	1.01	....	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	.98	21-21.9
22-22.9	.96	.98	1.02	.88	1.00	1.01	.97	....	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	.98	22-22.9
23-23.9	1.00	1.02	1.05	.92	1.02	1.01	.98	....	.97	.98	1.00	.97	....	....	....	....	.98	.99	.98	.98	23-23.9
24-24.9	1.03	1.06	1.07	.97	1.05	1.04	1.01	....	1.01	1.02	1.03	.97	$0.99	....	....	....	.98	1.03	.99	.98	24-24.9
25-25.9	1.07	1.09	1.10	1.01	1.08	1.07	1.04	....	1.05	1.06	1.07	.98	1.02	....	....	....	.98	1.07	1.01	.98	25-25.9
26-26.9	1.11	1.12	1.12	1.06	1.11	1.10	1.08	....	1.09	1.10	1.11	1.01	1.06	....	....	....	.98	1.11	1.04	.98	26-26.9
27-27.9	1.15	1.15	1.15	1.10	1.14	1.14	1.11	....	1.13	....	1.15	1.05	1.10	1.04	....	....	1.01	1.15	1.07	.98	27-27.9
28-28.9	1.18	1.18	1.17	1.15	1.17	1.17	1.14	....	1.17	....	....	1.08	1.13	1.08	....	....	1.04	1.19	1.10	1.00	28-28.9
29-29.9	1.20	1.20	....	1.19	1.20	1.20	....	1.17	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.13	1.02	29-29.9
30-30.9	1.23	1.23	....	....	1.23	1.22	....	1.21	....	....	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.16	1.04	30-30.9
31-31.9	....	....	....	....	....	1.24	....	1.25	....	....	....	1.19	1.24	1.19	1.04	1.12	1.14	....	....	1.06	31-31.9
32-32.9	....	....	....	....	....	....	....	1.29	....	....	....	1.23	1.28	1.23	1.07	1.14	1.17	....	....	1.09	32-32.9
33-33.9	....	....	....	....	....	....	....	1.32	....	....	....	1.27	....	1.26	1.10	1.17	....	....	....	1.11	33-33.9
34-34.9	**Kettleman Hills**	....	....	....	....	....	....	1.36	....	....	....	1.31	....	1.30	1.13	1.20	....	....	....	1.13	34-34.9
35-35.9	....	$1.23	....	....	....	....	....	....	....	....	....	1.35	....	....	1.16	1.22	....	....	....	....	35-35.9
36-36.9	....	1.26	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	....	36-36.9
37-37.9	....	1.29	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	....	37-37.9
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	38-38.9
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	39-39.9
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	40-40.9

Playa Del Rey: (FOB Standard Pipe Line) 20-20.9, $0.80; 21-21.9, $0.84; 22-22.9, $0.87.
Wheeler Ridge: 22-22.9, $0.76; 23-23.9, $0.80; 24-24.9, $0.83.
Newhall, Kern River, Kern Front, McKittrick & Round Mountain: 14-14.9, $0.73.

LOUISIANA-ARKANSAS

Posted by S. O. Louisiana, May 22, '41

Gravity	Atlanta, Ark. et al.*	De Soto, La. et al.	Rodessa, La. et al.	Olla, et al	Darrow, La. et al.	University, La.* (Baton Rouge) Shallow Production
40 & Above	$1.08	$1.18	$1.20	$1.35	$1.30	$1.48
39-39.9	1.06	1.16	1.18	1.33	1.28	1.46
38-38.9	1.04	1.14	1.16	1.31	1.26	1.44
37-37.9	1.02	1.12	1.14	1.29	1.24	1.42
36-36.9	1.00	1.10	1.12	1.27	1.22	1.40
35-35.9	.98	1.08	1.10	1.25	1.20	1.38
34-34.9	.96	1.06	1.08	1.23	1.18	1.36
33-33.9	.94	1.04	1.06	1.21	1.16	1.34
32-32.9	.92	1.02	1.04	1.19	1.14	1.32
31-31.9	.90	1.00	1.02	1.17	1.12	1.30
30-30.9	.88	.98	1.00	1.15	1.10	1.28
29-29.9	.86	.96	.98	1.13	1.08	1.26
28-28.9	.84	.94	.96	1.11	1.06	1.24
27-27.9	.82	.92	.94	1.09	1.04	1.22
26-26.9	.80	.90	.92	1.07	1.02	1.20
25-25.9	.78	.88	.90	1.05	1.00	1.18
Below 25	....	.86	.88	1.03	....	....
24-24.9	.76	....	.88	....	.98	1.16
23-23.9	.74	....	.86	....	.96	1.14
22-22.9	.72	....	.84	....	.94	1.12
21-21.9	.70	....	.82	....	.92	1.10
Below 21	.68	....	.80	....	.90	....
20-20.9	....	....	....	....	....	1.08
Below 20	....	....	....	....	....	1.06

*Posted July 2, '42.

Atlanta schedule includes Patton (a), Buckner, Lewisville, Magnolia, Village & Schuler (Jones Sand), Ark.

De Soto schedule includes Sabine, Fouke, Hommer, Miller Co., Sugar Creek, Lake St. John (4500 ft. prod.), Catahoula Lake (a) Cypress Bayou, Elm Ridge (a), Hemphill (a), Indian Bayou, Lake Larto and Nebo fields.

Rodessa schedule includes Cotton Valley & Shreveport (Cross Lake) ending with Below 25 at $0.88; Anse La Butte and Cado fields.

Olla schedule includes South Olla fields, Lake St. John (3500 ft. horizon), Little Creek (a), effective Feb. 3, 1943.

Darrow schedule includes Bayou Mallet, Bayou Sale (a), Bunkie, Choctaw, Eola, Jeanerette, Lirette, North Crowley, Pine Prairie, Port Allen, Port Barre, Potash, Roanoke, St. Martinville, South Crowley, and University (deep rod.) fields.

University schedule includes Hackberry (posted by Stanolind Oil & Gas, May 21, '41 ending with 34 & above at $1.36).

Golden Meadow—Feb. 1, 1943—Same as Continental's Acadia Parish postings but in addition 31-31.9, $1.07; below 31, $1.05.

Big Creek, McKamie, Columbia (a), Dorcheat, Macedonia (a), Distillates (Sour) . . $1.25
Heavy Smackover Crude 83
Cotton Valley Distillate (Sept. 1, '41) 1.40
Cotton Valley (Holloway Sand Crude) 1.25
Lisbon Distillate 1.20
Dorcheat, Macedonia Distillates (Nov. 16, '42) 1.30

(a) Initial posting which is subject to disapproval by the Office of Price Administration.

(Continued next column)

LOUISIANA-ARKANSAS (*Cont'd*)

Posted by Shell Oil Co., Inc. (May 20, '41)

	Iowa	Roanoke	Gibson
Below 20	$0.99	$0.94	$0.89
20-20.9	1.01	.96	.91
21-21.9	1.03	.98	.93
22-22.9	1.05	1.00	.95
23-23.9	1.07	1.02	.97
24-24.9	1.09	1.04	.99
25-25.9	1.11	1.06	1.01
26-26.9	1.13	1.08	1.03
27-27.9	1.15	1.10	1.05
28-28.9	1.17	1.12	1.07
29-29.9	1.19	1.14	1.09
30-30.9	1.21	1.16	1.11
31-31.9	1.23	1.18	1.13
32-32.9	1.25	1.20	1.15
33-33.9	1.27	1.22	1.17
34 & above	1.29	1.24	1.19

Iowa schedule includes Black Bayou & White Castle La. fields.

Roanoke schedule includes Chalkley, La. field.

Gibson schedule includes S. Houma, Hester & W. Lake Verret, La. fields.

Happytown field, St. Martin Par., La. $1.15

Posted by Arkansas Fuel Oil Corp.

Urania, La. (May 22, '41) $1.15

Olla, La Salle Parish same as Olla schedule posted by S. O. Louisiana, effective Feb. 3, 1943.

Posted by Continental Oil Co. (May 21, '41)

Tepetate, La $1.18
Ville Platte, La 1.20
Lake Arthur, La 1.18

Abbeville, La.

Below 36 $1.07	37-37.9 $1.11	39-39.9 $1.15
36-36.9 1.09	38-38.9 1.13	40 & above 1.17

Acadia Parish (Evangeline), La.

Below 32 $1.07	34-34.9 $1.13	37-37.9 $1.19
32-32.9 1.09	35-35.9 1.15	38-38.9 1.21
33-33.9 1.11	36-36.9 1.17	39-39.9 1.23
		40 & above 1.25

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario (Nov. 6, 1939)

Petrolia . . . . . $2.35 Oil Springs $2.42

Turner Valley Crude Oil (July 16, '41)

(Prices FOB producer's tankage)

33-33.9 $1.50	44-44.9 $1.72	55-55.9	$1.94
34-34.9 1.52	45-45.9 1.74	56-56.9	1.96
35-35.9 1.54	46-46.9 1.76	57-57.9	1.98
36-36.9 1.56	47-47.9 1.78	58-58.9	2.00
37-37.9 1.58	48-48.9 1.80	59-59.9	2.02
38-38.9 1.60	49-49.9 1.82	60-60.9	2.04
39-39.9 1.62	50-50.9 1.84	61-61.9	2.06
40-40.9 1.64	51-51.9 1.86	62-62.9	2.08
41-41.9 1.66	52-52.9 1.88	63-63.9	2.10
42-42.9 1.68	53-53.9 1.90	64 & over	2.12
43-43.9 1.70	54-54.9 1.92		

Absorption Gasoline (July 16, '41)

90% Rec., 20 lb. Reid v.p. $2.28
90% Rec., 17 lb. Reid v.p. 2.44

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co. (May 20, '41)

Salt Creek (except Tensleep crude), Midway & Dutton Creek, Wyo.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Wyoming:		Wyoming:	
Tensleep (Salt Creek)	$0.82	Grass Creek Light	$1.00
Tensleep (Elk Basin)	.82	Grass Creek Heavy	.65
Frannie Light	.85	Elk Basin	1.00
Frannie Heavy	.62	Iles, Colo.	1.07
Hamilton Dome	.45		

Posted by Ohio Oil Co. (May 20, '41)

Elk Basin, Wyo. Light	$1.00
Elk Basin, Wyo., Heavy	.82
Grass Creek, Wyo., Light	1.00
Grass Creek, Wyo., Heavy	.65
Rock Creek, Wyo.	1.15
Lance Creek, Wyo., (July 1, '41)	1.12
Oregon Basin, Wyo.*	0.65
Garland, Wyo.*	0.60
Byron, Wyo.*	0.70

*Postings newly added by NPN and effective March 4, 1943.

Posted by Continental Oil Co. (May 21, '41)

Ft. Collins & Wellington, Col.

Below 29 $0.96	32-32.9 $1.04	36-36.9 $1.12
29-29.9 .98	33-33.9 1.06	37-37.9 1.14
30-30.9 1.00	34-34.9 1.08	38-38.9 1.16
31-31.9 1.02	35-35.9 1.10	39-39.9 1.18
		40 & above 1.20

Canon City & Florence, Col.	$1.05	Big Muddy, Wyo., (May 30, '41)	$1.08
Cat Creek, Mont.	1.15	Lance Creek, Wyo., (July 1, '41)	1.12

Posted by Independent Pipe Line Co. (Aug. 1, '41)

Falls City, Neb., field price	$0.90
Falls City, Neb., loaded in tank cars	0.95
Shubert, Neb., loaded in tank cars	0.97

SOUTHEASTERN FIELDS

Posted by Allied Pipe Line Corp.

Tinsley (Miss.) Crude (Oct. 16, '41)

24-24.9	$0.745	32-32.9	$0.905
25-25.9	.765	33-33.9	.925
26-26.9	.785	34-34.9	.945
27-27.9	.805	35-35.9	.965
28-28.9	.825	36-36.9	.985
29-29.9	.845	37-37.9	1.005
30-30.9	.865	38-38.9	1.025
31-31.9	.885	39-39.9	1.045
		40 & above	1.065

Pickens (Miss.) Crude (Dec. 16, '41)

24-24.9	$0.685	32-32.9	$0.845
25-25.9	.705	33-33.9	.865
26-26.9	.725	34-34.9	.885
27-27.9	.745	35-35.9	.905
28-28.9	.765	36-36.9	.925
29-29.9	.785	37-37.9	.945
30-30.9	.805	38-38.9	.965
31-31.9	.825	39-39.9	.985
		40 & above	1.005

Dormant Equipment can Work or Fight - -
IF YOU CAN'T FIND A USE FOR IT, *Scrap it!*

WAR-OIL EQUIPMENT EXCHANGE

For Sale

FOR SALE: Bolted tanks 5000 and 10,000 barrel capacity API construction, practically new. Feldman Petroleum Co., 544 W. Roosevelt Rd., Chicago, Ill.

FOR SALE: 2—15300 ver. tanks, 1—6300 horizontal tank, 2 pumping units including motors, 1 1936 Dodge tank truck, 1 1935 Ford tank truck. P. O. Box 849, Muncie, Indiana—Tel. 21132.

GASOLINE TANK

100,000 Gallon Gasoline Tank—located in Detroit. For information inquire

F. L. Tracy
2313 Madison Ave., Toledo, Ohio

Situation Open

WANTED

Chemist or lubricating engineer with experience in grease analysis and manufacture. Must be capable of making complete grease analysis.

Wanted by independent grease manufacturer located in the midwest. Permanent position with opportunity for advancement. Essential industry. Applicant must clear through nearest U. S. Employment Office. Those in essential industry should not apply.

Give complete qualifications.

Address Box 217.

WANTED—Chemist with 2 or more years laboratory experience in petroleum products. Permanent position. State education, draft status and salary required. Apply to Box No. 218.

PROCESS ENGINEERS

Graduate Chemical Engineers and Chemists. Prefer men with experience in refinery or gasoline plant on design or operation of light end equipment. Location—Mid-West. Permanent position. In reply state experience, education, age, draft status and salary expected.

Address Box No. 209
National Petroleum News

Wanted to Buy

WANTED TO BUY

12—Vert. or Horiz. Bulk Station
10,000 to 20,000 gal. Steel Storage Tanks.
2—3000 to 5000 bbl. Field Tanks. 3—Large Semi Trailer Tanks.

The Darien Corporation
49 E. 41st St., New York, N. Y.
Telephone Mu. 2-0042

Professional Services

ACCURATE LABORATORY TESTS
GASOLINE OIL
Standard Methods Employed
Octane Ratings by A.S.T.M. CFR Unit
THE DETROIT TESTING LABORATORY
554 Bagley Avenue, Detroit, Mich.

GEORGE A. BURRELL
Consulting Petroleum Engineer
Design Construction Reports
Suite 1909,
20 Pine Street — New York City
1936-42 Fifth Ave. — Pittsburgh, Pa.

ANTI-KNOCK VALUES
DETERMINATORS
The Gray Industrial Laboratories
Chemists and Engineers
Specialists on Petroleum Products
961-976 Frelinghuysen Ave.,
NEWARK, N. J.
Telephone Bigelow 3-4020

Classified Rates

"For Sale," "Wanted to buy," "Help Wanted," "Business Opportunities," "Miscellaneous" classifications, set in type this size without border—15 cents a word. Minimum charge, $4.00 per insertion.

"Position Wanted"—10 cents a word. Minimum charge $1.50 per insertion.

Advertisements set in special type or with border—$5.00 per column inch.

Copy must reach us not later than Saturday preceding date of issue.

All advertisements carried on this page are payable in advance.

No agency commission or cash discounts on classified Advertisements.

National Petroleum News

Copyright 1943 by The National Petroleum Publishing Co.

Trade Mark Registered U. S. Patent Office

Published every Wednesday by
The National Petroleum Publishing Co.

WARREN C. PLATT, *Editor and Publisher*
V. B. GUTHRIE, *Managing Editor*

Member of Audit Bureau of Circulation and Associated Business Papers Inc.

Publication office: 1213 W. Third St., Cleveland, Ohio, U. S. A. Telephone, CHerry 7672. Cable Address PLATTOIL, Cleveland. Cable inquiries are answered by mail unless subscriber advances sufficient funds in American money to cover our cable costs.

NEWS BUREAUS

New York, 50 W. 50th street, Telephone Columbus 5-1516 and 5-1517.

Washington, D. C., 1034-36-38 National Press Bldg., Telephone, NAtional 3477.

Tulsa, Okla., 904 World Bldg., Telephone, 3-7132.

Los Angeles, 610-A Hillstreet Bldg., Telephone, VAndike 2845.

Chicago, 59 E. Van Buren Street, Telephone, Harrison 5901-2-3.

Subscription rate $5 per year in United States, Mexico and Pan-American Countries; $6.50 in Canada and Foreign Countries. Current copies 20 cents, except special issues; back copies more than two months old 30 cents per copy.

Business Opportunity

Complete Lubricating Oil and Grease plant making real money; about 2000 established accounts. Will sell three-fourths interest. Business is good. No debts. Will require about $25,000 to handle. Box No. 215.

WORKING CAPITAL AVAILABLE

Large independent marketer handling government contracts desires connection with refinery producing fuel oil, kerosene and gasoline. Prepared to invest substantial working capital or will consider outright purchase of refinery. All replies confidential. Write or wire

Box No. 219

National Petroleum News

ADVERTISERS' INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions.

Alemite
American Flange & Mfg. Co. 25
Arkansas Fuel Oil Co.
Armstrong Rubber Co. 31
Autocar

Badger & Sons Co., E. B. 27
Battenfeld Grease & Oil Co.
Blackmer Pump Co. 38
Bowser & Co., S. F
Brodie Co. Inc., Ralph N.
Brown Steel Tank Co.
Buckeye Iron & Brass Works
Butler Manufacturing Co.

Champion Spark Plug Co.
Cities Service Oil Co.
Coastal Tank Lines, Inc.
Columbian Steel Tank Co.
Continental Can Co. 17
Crown Can Co.
Ethyl Corp.

Erie Meter Systems, Inc.

Farrell Mfg. Co.
Fruehauf Trailer Co.
Fleet-Wing Co. Outside Back Cover
Freedom Oil Co.

General American Trans. Corp.
General Motors Corp. 37
Gilbert & Barker Mfg. Co.
Goodrich, B. F.
Goodyear Tire & Rubber Co.
Graver Tank and Mfg. Co. 29
Gulf Oil Corp.

Heil Co.
Houdry Process Corp. 21
Humble Oil & Refining Co.

Inland Steel Container Co.

John Wood Mfg. Co.
Johnston & Jennings Co. 39

Kidde Co. Inc., Walter 18

Mack Manufacturing Co.
McDonald Refg. Co., A. Y.
Marshall, Inc., Clare M.
Master Electric Co.
Mid-Continent Petroleum Corp.
Morrison Bros. Inside Front Cover

National Petroleum News
Neptune Meter Co.
North American Car Co.

Pennsylvania Grade Crude Oil Assn. 33
Pittsburgh Equitable Meter Co.
Pure Oil Co.
Platt's Oil Law Gram Service
Platt's Oilgram News Service 35
Platt's Oil Price Handbook
Platt's War-oil Handbook Inside Back Cover

Red Cross
Republic Oil Co.

Shell Oil Co., Inc.
Sinclair Refg. Co., Inc.
Socony-Vacuum Oil Co. 22-23
L. Sonneborn Sons, Inc.
Standard Oil Co. of Calif.
Standard Steel Works
Steel Products Co., Inc.
Sun Oil Co.

Thiokol Corp.
Timken Detroit Axle Co.
Tokheim Oil Tank Co.
Truck Parts

Universal Oil Products Co.

Venango Refining Co.
Viking Pump Co.

Wayne Pump Co.

About OIL PEOPLE

J. G. Jordan

Shell Oil Co. has announced the appointment of **J. G. (Doc.) Jordan** as manager of retail sales for the West Coast territory, with headquarters in San Francisco. "Doc", for the past 11 years has been Shell's Cleveland division manager. He was succeeded by **R. D. Kizer,** who was in charge of the Detroit division. Mr. Kizer in turn is succeeded by **John Southworth,** formerly manager of light oil sales for Shell's West Coast territory.

R. D. Kizer

All of these executives came up the "hard way". Mr. Jordan joined Shell in 1925 as a clerk in St. Louis; Mr. Kizer started as a bookkeeper in Indianapolis in 1925; Mr. Southworth joined the Shell organization as a service station operator in Portland, Ore., about the same time.

° ° °

John M. Martin, assistant general manager of the eastern marketing division of Socony-Vacuum since 1931, has been promoted to general manager, succeeding **Walter L. Faust,** elected vice-president.

Mr. Martin joined the company in 1904 as a junior clerk in Albany, became a specialty and general salesman, district manager, and later division manager at Albany, Boston and New York. In 1931 he was transferred to "26". He was active in consolidating Socony and Vacuum plants in the 30's.

° ° °

Walter Dumont, Chicago, District 2 PAW transportation director, is on an extended leave of absence, beginning April 1, following a serious operation. **Paul Bond,** his assistant, will handle the work until Mr. Dumont returns.

° ° °

From "Somewhere in the Middle East", via Associated Press War Correspondent Clyde A. Farnsworth, comes word that **Lieut. Gerald Anthony (Jerry) Sadler,** formerly of the Texas Railroad Commission, is worried about his snuff supply. Lieut. Sadler left for the wars with enough to last for 2 years. He can't get snuff in the Middle East, which he fears may cause him great consternation. Describing the former railroad commissioner as a minister extraordinary from Texas, Farnsworth, in a dispatch, said Lieut. Sadler has told him "snuff dipping is the mark of men with hair on their chest." When in a philosophical mood, which is often, Farnsworth related, the Texan said: "Smoke is the ghost of tobacco; chewing tobacco is the body, but snuff is the soul."

° ° °

Miller W. Conn, Bartlesville, manager of the Perco section, Phillips Petroleum Co.'s special products department, has joined the U. S. Navy as a Lieutenant, s.g. **A. E. Buell** succeeds him as acting manager.

° ° °

Robert W. Hadlick, organizer and secretary for its half dozen years of the Missouri Independent Oil Jobbers Assn. now at St. Louis, is reporting for duty with the army April 8. The association's affairs will be managed by its board of directors for the duration.

° ° °

J. Sayles Leach, Houston, vice-president, The Texas Co., has been appointed chairman of PAW's marketing committee for District 3, succeeding **Roy B. Jones,** Wichita Falls, president of Panhandle Refining Co., who is retiring from business.

° ° °

John H. Schaefer

John H. Schaefer, New York, general manager of manufacturing, research and traffic for Ethyl Corp., has been elected a vice-president. He will continue to head these activities.

Mr. Schaefer joined Ethyl in 1926 as head of the Deepwater, N. J., blending plant. Previously, he was chemical engineer at Massachusetts Institute of Technology's research laboratory of applied science, from which he holds a science degree. He also holds a degree from the University of Delaware.

° ° °

Capt. O. F. Bakhaus, who recently left Texaco at Huntington, W. Va., to serve with the army, wrote the other day to ask us to send his NPNs to a new address. "Your early handling of this request will be appreciated, as I do not want to miss any issues of your publication. This will now be my best contact with the oil world 'till the war is over and I go back to my old job," he wrote.

° ° °

Louis P. Donovan, Shelby, Mont. attorney, and legal consultant for Santa Rita Oil & Gas Co. and Northwest Refining Co., Cut Bank, Mont., has been elected a director of the former. The two companies became affiliated in December with the New Jersey Standard.

Phillip M. Robinson

PAW's refining division gave a farewell dinner for Phillip M. "Pinkie" Robinson, assistant director of refining, on April 1, at the Statler Hotel, Washington, D. C., attended by 77 persons nearly all of whom were from PAW. Mr. Robinson resigned from PAW because of his health. He plans to spend several weeks resting at his home in Detroit, Tex., before deciding on his future plans.

Mr. Robinson was one of the first oil men to come to Washington to handle oil problems related to the defense program, serving as assistant to Dr. R. E. Wilson, Pan American Petroleum and Transport Corp., who was then petroleum consultant to the National Defense Advisory Commission and later Office of Production Management from December, 1940, until August, 1941. He joined PAW, then the Office of Petroleum Coordinator, on Aug. 24, 1941.

For 3 months after the resignation of Wright Gary, PAW's refining director, Mr. Robinson was acting refining director.

Just prior to coming to Washington, Mr. Robinson was chief engineer for the Pennzoil Co., Oil City, Pa. He has served as chairman of the technical committee of the Pennsylvania Crude Oil Assn. and vice-chairman of the Pittsburgh section of the Society of Automotive Engineers.

° ° °

W. G. Franke, formerly sales manager, American-Mexican Petroleum Co., is now assistant manager of Berry Asphalt Co., Chicago.

° ° °

Charles P. Hirth, Chicago, vice-president of Hughes Oil Co., is spending a 3-week vacation with his son, who is in military service at San Francisco.

° ° °

Samuel L. H. Burk, Philadelphia, chief job analyst for Atlantic Refining Co. for the past 9 years, has joined Triumph Explosives, Inc., as director of industrial relations for the Elkton, Md., ordnance plant.

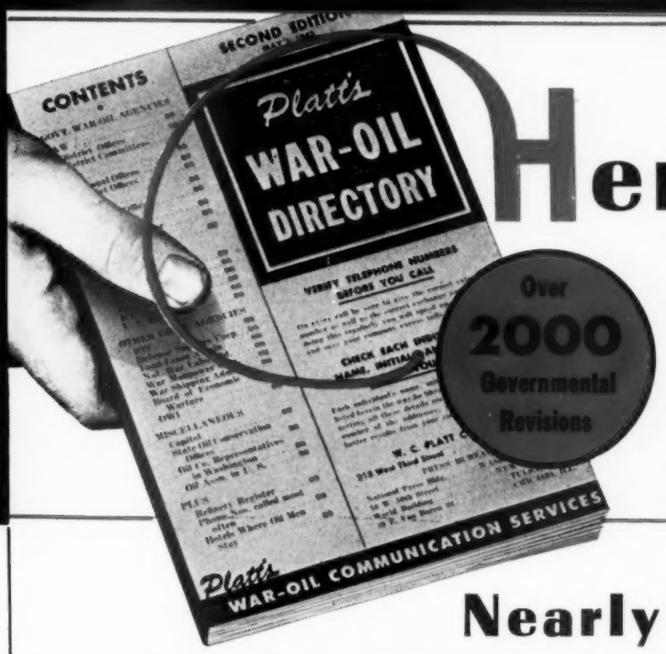
° ° °

Luther Williams, editor of Mid-Continent Petroleum Corp.'s house organ, *The Diamond,* has been elected president of the Tulsa Advertising Federation.

° ° °

John C. "Jack" Ebel, New York, able and affable acting editor of *Shell News,* Shell Oil Co. house organ, left March 30 on military leave of absence to join the Army.

Platt's WAR-OIL DIRECTORY



Here it is!

SECOND EDITION

Revised as of

May 1st, 1943

CONTENTS

Correct names, initials, titles, addresses, room numbers, telephone numbers and extensions of individuals of interest to the oil industry in the following war-oil groups:

Government War-Oil Agencies

(OFFICIAL AND SEMI-OFFICIAL)

PETROLEUM ADMINISTRATION FOR WAR
PETROLEUM INDUSTRY COMMITTEES
OFFICE OF DEFENSE TRANSPORTATION
OFFICE OF PRICE ADMINISTRATION
PETROLEUM INDUSTRY WAR COUNCIL
OFFICE OF RUBBER DIRECTOR
RUBBER RESERVE COMPANY
WAR PRODUCTION BOARD

Other Government War Agencies

ARMY & NAVY MUNITIONS BOARD
BOARD OF ECONOMIC WARFARE
BOARD OF RESEARCH & INVESTIGATION —TRANSPORTATION
DEFENSE PLANT CORPORATION
DEFENSE SUPPLIES CORPORATION
LEND-LEASE ADMINISTRATION
NATIONAL RESOURCES PLANNING BOARD
NATIONAL WAR LABOR BOARD
OFFICE OF ALIEN PROPERTY CUSTODIAN
OFFICE OF CIVILIAN DEFENSE
OFFICE OF COORDINATOR OF INTER-AMERICAN AFFAIRS
OFFICE OF ECONOMIC STABILIZATION
OFFICE FOR EMERGENCY MANAGEMENT
OFFICE OF SCIENTIFIC RESEARCH & DEVELOPMENT
OFFICE OF WAR INFORMATION
RECONSTRUCTION FINANCE CORPORATION
WAR MANPOWER COMMISSION
WAR SHIPPING ADMINISTRATION

Government Departments

STATE	TREASURY	AGRICULTURE
WAR	JUSTICE	COMMERCE
NAVY	INTERIOR	LABOR

CAPITOL AND CONGRESS
FEDERAL SECURITY AGENCY
FEDERAL TRADE COMMISSION
FEDERAL WORKS AGENCY
INTERSTATE COMMERCE COMMISSION
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS
UNITED STATES MARITIME COMMISSION
UNITED STATES TARIFF COMMISSION

Nearly 200 pages of TIME and MONEY saving data

HERE'S the new (2nd) edition of Platt's War-Oil Directory that you have been writing and calling us up about. It is going to press May first—right on the dot, revised right up to the last minute. Government agencies, oil men's associations, state officials and hundreds of individuals, all over the country are cooperating with us *enthusiastically* to make this new edition better and as nearly 100% accurate as possible.

It contains over 2000 names with correct titles, addresses, telephone and extension numbers, of the men and women who are active in the war-oil program. It lists all important War-Oil Committees with full directions for locating their key members. These are the people to whom you must write letters—call on the long distance telephone—and negotiate with daily.

Lies Flat On Your Desk

Every PBX Operator Needs Copy

The government is demanding that we in the oil industry make more efficient use of the long distance telephone. Here is one way you can cooperate easily and to your own advantage. See that your PBX operators—all of them—have each a copy of this book for instant reference. She can then call the man you want to talk to with the least possible delay—and without going through the telephone company's directory service.

Save Money on Long Distance Calls

There are 40,000 to 50,000 people being served by some of these war agency exchanges. By calling the extension number—as well as the exchange number—you not only get your calls through faster, but you avoid many mistakes that will show up on your telephone bill later.

Your Stenographers and Secretaries All Need a Copy

The Post Office is urging oil men to help it, too. The Post Office has a manpower shortage just like everyone else. It wants us to avoid misdirected letters and incomplete addresses. That makes sense. By obviating any necessity for going through the Post Office's directory service, you will insure your letter's reaching its destination in the shortest possible time.

Business Courtesy That Pays

This directory will make it easy for your secretaries and stenographers to spell your correspondent's name correctly—and get his title and initials right, using the form of salutation which he personally prefers. A man's name—and often his title—are among his most precious possessions and he appreciates having them spelled and abbreviated according to his own ideas.

Get Your Order In At Once

A directory of governmental personnel ages rapidly these days. That is why they have to be reissued frequently. The sooner you receive your copy, the more use you will get out of this book and the more you will get for your money. Mail the coupon today.

ORDERS received before May 1st will be mailed by May 10th

PRICES

Quantity	Prices
Single Copy	$2.25 each
10 to 24	1.95 each
50 and over	1.90 each

Platt's War-Oil Communication Services, 4743
1213 West Third Street, Cleveland, Ohio

Ship me ..... copies "PLATT'S WAR-OIL DIRECTORY"

right away. Check is attached for $ .....

Name .....

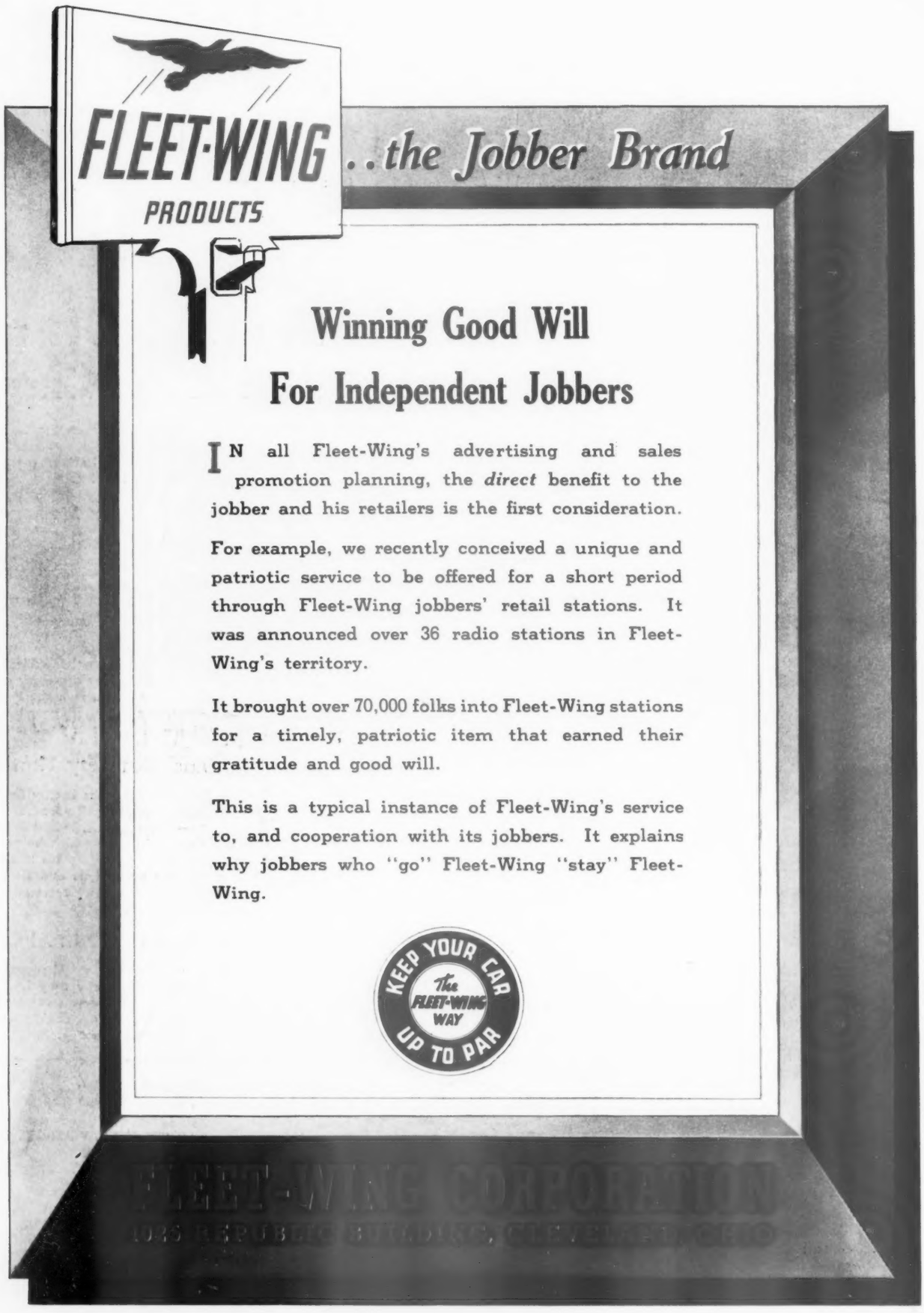
Company .....

Address .....

City-State .....

Platt's

WAR-OIL COMMUNICATION SERVICES


FLEET-WING
PRODUCTS
..the Jobber Brand
Winning Good Will
For Independent Jobbers
IN all Fleet-Wing's advertising and sales promotion planning, the direct benefit to the jobber and his retailers is the first consideration.
For example, we recently conceived a unique and patriotic service to be offered for a short period through Fleet-Wing jobbers' retail stations. It was announced over 36 radio stations in Fleet-Wing's territory.
It brought over 70,000 folks into Fleet-Wing stations for a timely, patriotic item that earned their gratitude and good will.
This is a typical instance of Fleet-Wing's service to, and cooperation with its jobbers. It explains why jobbers who "go" Fleet-Wing "stay" Fleet-Wing.
KEEP YOUR CAR
The FLEET-WING WAY
UP TO PAR
FLEET-WING CORPORATION

NATIONAL PETROLEUM NEWS

Monthly Technical Section Devoted to

REFINERY MANAGEMENT *and* PETROLEUM CHEMICAL TECHNOLOGY

Volume 35 | April 7, 1943 | Number 14

FIGHTING DECK ON THE HOME FRONT—*Catwalk of one of the 4 reactor vessel units of the Buna S plant of Firestone Tire & Rubber Co., one of the first plants to be completed in the government's wartime synthetic rubber program. Polymerization of butadiene and styrene into rubber latex takes place in the dome-shaped tanks. For more pictures of this and another war rubber plant, see pgs. R-168, 169.*

Things the Plant Crew Can Do To Improve Efficiency of Cooling Water System

With new operating conditions because of readjusted yields among other problems, such simple maintenance as cleaning and adjusting sprays and repairing towers will help provide sufficient supply R-148

Revamping Catalytic Polymerization Unit To Make Codimer for Aviation 'Gas'

Clean feed of butane-butylene cut and provision for suitable cooling of gases in contact with catalyst are essential requirements for small plants converting to this wartime operation R-156

Detergents and Lubricants Additives Derived from Petroleum Sources

By R. L. Wakeman and B. H. Weil

Chemicals-from-petroleum field includes raw materials for synthetic surface-active agents used in many industries, and for improving various properties of lubricants: Fifth Article in ABC Series R-161.

Re-Refining of Aircraft Engine Oils Proposed To Conserve Supply

By Gilbert K. Brower

Savings in consumption by military agencies cited as feasible through reclaiming used lubricants at principal bases. Method of reclaiming oil used by leading commercial air line described R-172

The Catalytic Vapor-Phase Alkylation Of Benzene with Ethylene

By W. A. Pardee and B. F. Dodge

Results are presented of reactions between ethylene and benzene vapors under the influence of various catalysts to form ethylbenzene R-180

Proposal Before Congress To Socialize All Technological Manpower

Provisions of Senate Bill 702 which would regiment petroleum chemists, engineers and technicians and nullify American patent system are analyzed by oil industry authority R-188

3 S.A.E. VICE-PRESIDENTS ARE OIL MEN

EMPHASIZING THE IMPORTANCE of fuels and lubricants problems in a wartime economy for the nation built so largely around the internal combustion engine, three of the 10 vice-presidents for 1943 of the Society of Automotive Engineers are representatives of the petroleum industry. The current activities of the Society, as of the automotive industry, are dedicated to serving the needs arising from the war emergency.

Grover C. Wilson

William M. Holaday

George Krieger

William M. Holaday is S.A.E. vice-president for fuels and lubricants activities. He is now in charge of the Aviation Section, Office of Petroleum Administration for War, Washington, relinquishing for the duration his position as research engineer in the general laboratories of Socony-Vacuum Oil Co., Inc., New York. Since 1925, when he graduated from Ohio State University with a degree in mechanical engineering, he has been engaged in oil company research work.

In bringing together in meetings oil company technologists, engine designers, maintenance men and military representatives, to consider common problems, this S.A.E. activity is making an important contribution to the war effort. Mr. Holaday is also chairman of several committees of the Cooperative Research Council, a joint organization representing the automotive industry through the S.A.E. and the oil industry through the American Petroleum Institute. Its present work is on wartime problems.

George Krieger is S.A.E. vice-president for tractor and farm machinery activity. On leave of absence from the Ethyl Corp., Detroit, where he has directed that company's farm tractor program, he is now a deputy director of the Farm Machinery and Equipment Division of the War Production Board. Once before, in 1935, Mr. Krieger was S.A.E. vice-president for tractor activity and he has been a member of this activity committeee for several years. He is chairman of the Tractor and Farm Machinery Conservation Committee of the S.A.E. Tractor War Emergency Committee and chairman of the Fuels and Lubricants Committee of the American Society of Agricultural Engineers.

Grover C. Wilson is S.A.E. vice-president for Diesel-engine activity. He recently joined the staff of the Universal Oil Products Co. as assistant director of the Automotive and Aircraft Department at Riverside, Ill. After teaching internal-combustion engine courses at the University of Wisconsin, he engaged in research work on high speed Diesel engines from 1929 to 1938. He has conducted several surveys among Diesel engine manufacturers for the Refiners' Committee of the American Petroleum Institute. During World War I he was a lieutenant in the Anti-Aircraft Service in France.

REFINERY MANAGEMENT *and*
PETROLEUM CHEMICAL TECHNOLOGY

April 7, 1943
Volume 35
Number 14

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

Inventive Minds Can't Function in a Strait-Jacket

THE socializing for the future, beyond the war, of petroleum chemists, engineers and indeed numerous others in the oil industry who do not consider themselves professional workers, is provided in legislation now before Congress, and which is cloaked with the purpose of mobilizing technological manpower for more efficient conduct of the war.

One bill, S. 702, introduced by Senator Kilgore of West Virginia in February, is a revision with broader powers extended into peacetime, of a similar bill to establish an office of Technological Mobilization which a few months ago reached the stage of hearings before a Senate committee. Another bill, S 607, also introduced in February by the same senator, contains similar proposals. Under this bill, however, this would be done in one of 4 offices set up under a supervising Office of War Mobilization, which would organize entirely new bureaus and take over direction of the war effort from all the present agencies. This bill is defined as a war measure and would remain in force for 6 months after the termination of the war.

Bill 702, however, proposes a continuing law, its statement of policy declaring that "the full development and application of the Nation's scientific and technical resources are necessary for the effective prosecution of the war AND FOR PEACETIME PROGRESS AND PROSPERITY." It is to this proposal, emanating from the economic theorists in Washington, that the technologists of the oil industry as of all industries, should give their attention regardless as to how fantastic the plan may now appear to them. For the socializing of the nation's research and industrial development efforts could only lead to the socializing of industry itself and eventually of the entire national economy.

Here are some of the things proposed in Bill 702, "to mobilize the scientific and technical resources of the Nation, to establish an Office of Scientific and Technical Mobilization and for other purposes": First, there is extremely wide latitude in the definition of the technical manpower which would be used "to develop comprehensive national programs for the maximum use of science and technology in the national interest in periods of peace and war." Scientific and technical personnel is defined as all persons, "excepting physicians and dentists, who have completed any course of study in any college or university in any branch of science or its application, or who have had not less than 6 months' training or employment in any scientific or technical vocation". Under this broad classification could come many oil company heads and plant managers and superintendents who came up from the ranks and served an apprenticeship in a skilled trade, or whose college work included some almost forgotten and never applied branch of science.

Scientific and technical facilities, likewise to be mobilized under this law in the national interest in peace as well as wartime, are also widely defined in the bill to include all research institutions and their work and their acquired knowledge.

THIS tremendous job of directing all the nation's scientific resources and personnel including development departments of companies, research institutions and scientific schools, would be placed in the hands of an Administrator of the Office of Scientific and Technical Mobilization, to be appointed by the President. There is nothing in the bill which sets up any qualifications of training or experience for a position which the nation's greatest scientists would approach only with a feeling of humility at their own limitations. Actually, this position could be filled by an individual of the type who now man some government bureaus whose duties involve technology, professors, consultants and advisors whose minds run to fuzzy thinking on broad social planning.

Also, under this proposed law, our present patent system, under which the nation has made such marvelous industrial progress for 150 years, would be nullified by granting the Office of Scientific and Technical Mobilization authority for the exclusive right to use and license under any patent covering apparatus or process with which the government has been "associated" since the declaration of national emergency of May 27, 1941, by the contribution of any "money, credit, physical facilities or personnel".

A BROAD definition of a "contribution" could include all the patents resulting from the work of research departments of industrial concerns which had had government loans or where the services of any government employe or facility had been in any way involved. The compensation to an inventor for the government taking over all his rights in an invention would be solely a matter for the administrator of the office to determine.

The revolutionary legislation contemplated in this bill is based on the assumption that private industry has failed in making efficient use of our scientific personnel and facilities in meeting the war emergency. The declaration of the bill claims that information concerning scientific and technical resources is in an unassembled and uncoordinated state and that the training, development and use of scientific and technical personnel, resources and facilities has been "unplanned and improvident" in relation to the national need. This is a plain falsehood. What has been accomplished by the scientists of industry in the short space of time given them in converting our enterprises from making peacetime products to materials for war in volumes outstripping our enemies is nothing short of astounding. This has been done under conditions of pressure, organizational difficulties, political attacks and efforts to discredit their undertakings and total inexperience in building a war machine, among other problems.

LIKEWISE, this proposed legislation in Bill 702 assumes that government bureaus can do a better job of supervising our scientific endeavors than can private industry, in war and peacetimes. One looks in vain for such evidence. Where in the present war program can government scientists or technologists be found as the directing force? What outstanding invention or contribution to the war machine has come from the scientists in any government bureau? In anticipating our possible needs for synthetic rubber through loss of our natural rubber supplies and the need for aviation gasoline in the volumes required by modern warfare, examples with which petroleum technologists are familiar, government agencies had greater opportunity than private industry to know what might be required. Yet when the crisis developed it was to the technologists of the oil and rubber industries that the government turned for the programs and the methods for manufacturing the materials.

The difficulty in meeting the issue with legislation such as is proposed in Senate Bill 702, is that industry men generally take it for granted that such measures are too radical and revolutionary to pass, and the great majority of the public who oppose the principles do not make their opposition heard. Their lack of voice is accepted in many quarters at least as acquiescence with the proposal. Petroleum technologists who believe they can serve their country better under the freedom of initiative of private industry rather than under government regimentation should let their Congressmen know how they feel in this matter.—VBG

° ° ° ° ° °

On page 188 *of this issue is presented an analysis of the provisions of Senate Bill* 702 *by a leading petroleum scientist.*

769.6
772.422
772.43

Practical Methods for Improving Plant Cooling Water Systems

OBTAINING sufficiently cold water for processing requirements frequently presents a serious problem during the summer months for refinery and natural gasoline plant operators. At present, since many plants have altered throughput rates, reduced the end points of their gasolines and in some cases installed new equipment or are making products never before processed, the cooling water temperature problem has become aggravated.

It is true that oil "war plants", by reason of their contracts with the government, have sufficiently high priority ratings to get the necessary materials and equipment for new cooling towers. New units being installed include adequate cooling equipment. But even then there have been delivery delays on pumps, valves and piping. And in many cases, due to operation under price ceilings and other restrictive orders, most oil plants are trying to get along with the equipment on hand wherever possible.

Engineers point out that much can be done in many cases to restore old cooling equipment to its former efficiency or even increase it. Most of this "tickling" can be accomplished without great expenditure of money or materials; frequently the expense will be more than repaid in pumping cost savings or product recovery. Unfortunately, no general panacea can be presented, but the following are "tips" from equipment men which have been found to work seeming wonders in improving efficiency of the cooling equipment. To be successful, these tips should be carefully studied in the light of each individual case before applying them.

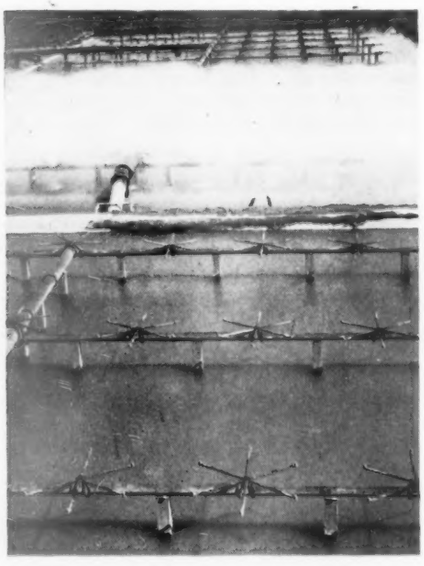


Fig. 2—Spray nozzles are too close to the surface of this spray pond

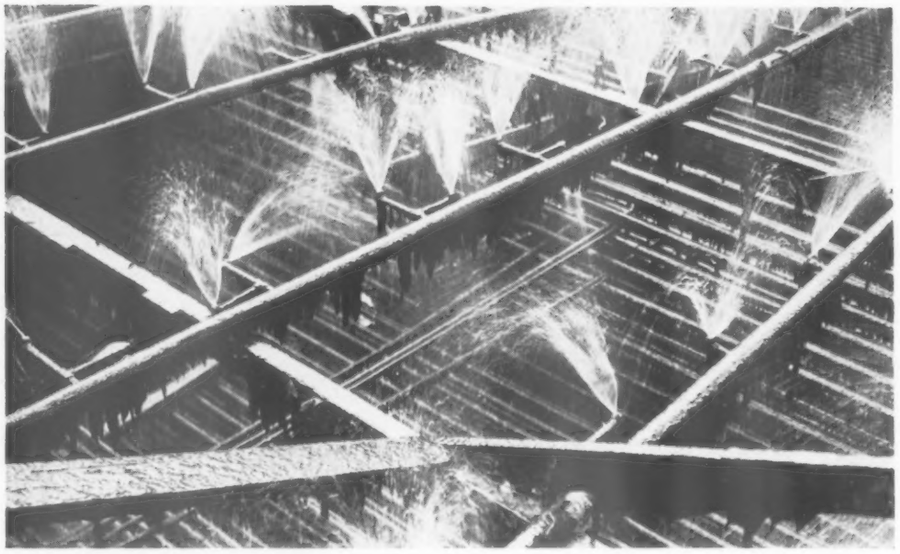


Fig. 1—The operator of this deck tower secured vastly more efficient operation by cleaning his tower and installing more efficient spray nozzles

One of the first things to be considered, regardless of whether equipment is atmospheric or induced draft, is whether or not the equipment is clean or fouled with scale and organic growths (Fig. 1). Fouled equipment cannot be expected to perform efficiently, no matter its design. Volumes have been written on the subjects of removal and prevention of scale accumulations and organic growths, with both mechanical and chemical means advocated. A condensed bibliography of recent articles, prepared by B. A. Osborn of the Tulsa Public Library Technical Department, is available to refinery operators upon request.

Perhaps one of the most recent collections of data on corrosion and bio-fouling was the American Petroleum Institute symposium on corrosion of refinery equipment given at the Institute's mid-year meeting of the Division of Refining at Tulsa May 21, 1941. This was a continuation of the previous 5 symposia on this subject presented by the Institute's committee on corrosion of refinery equipment presented before meetings at Chicago, 1936; Wichita, 1938; Chicago, 1938; New Orleans, 1939; and Ft. Worth, 1940. Much of the data presented there has been published in the Institute's proceedings. Most of the water treating companies have published more or less elaborate technical brochures on various phases of water treating. Several companies also have published what are considered to be excellent treating manuals and handbooks.

Extensive research and experimentation now is going on in many refineries and gasoline plants in an attempt to conquer individual water problems or to develop better methods for descaling and cleaning. A recent chemical descaling method is discussed in an article appearing elsewhere in this issue. (*See p.* R-152) Many professional water treaters are excellently equipped to help solve their customers' individual problems.

Among the successful methods for various types of control reported by several refiners are given the following:

If the water contains a high percentage of calcium bicarbonate, frequently the bicarbonate ion may be removed by treatment with sulfuric acid followed by air-blowing in an open tank to remove carbon dioxide. Concentration of calcium sulfate in the water is of course increased, but authorities report this is not harmful unless $CaSO_4$ content of raw water is already high; it is soluble up to 2200 parts per million (p.p.m.) at temperatures ordinarily encountered in cooling systems.* Use of sodium hexametaphosphate, and also sodium dichromate, have been advocated to reduce deposition of calcium carbonate scale and also to prevent corrosion where water is of low hardness, initially. To control bio-fouling, chlorination and use of copper sulfate or potassium permanganate have been suggested and widely practiced. Due care must be taken with the use of sulfuric acid *not* to permit the water to become acid; an extremely close check of the water must be kept at all times to avoid serious corrosion from the acid.

Some treating companies are reported to have developed chemicals which will "hold

*Symposium on Corrosion of Refinery Equipment, *NPN June* 25, 1941, *pp.* R-194-207.

up" or prevent scale precipitation to 40 or 50 p.p.m., with some claims heard of hold-ups to considerably higher amounts, above 1000 p.p.m. It is suggested, however, that these individual problems of hardness control be taken up with the treating companies themselves.

Cooling water equipment may be classified into 2 general types, atmospheric and induced draft. The former may be further subdivided into spray ponds and cooling towers. "Tickling" operations will be taken up in the following order: Spray ponds atmospheric or deck towers, and induced draft towers, the order of their relative cooling efficiency.

Spray Ponds

Engineers recommend that spray pond nozzles should be at uniform height of 7 ft. above the surface of water in the pond (Figs. 2 and 3.) At this elevation, air will get under the spray as well as over the top, thus giving greater contact and more evaporation. Also, the fine droplets of water will remain in the air longer, providing greater contact time.

If possible, the spray pond should be long and narrow, rather than square. There should be no equipment located nearby which would interfere with prevailing winds. Long side should be at right angles to the direction of the prevailing winds, so that the greater number of sprays will be exposed to the "dry" air.

Nozzle pressure should be increased to 7 lbs. p.s.i. maximum. This will throw spray higher in the air and increase contact time. Check the nozzles and descale if necessary; see that they are throwing a good, uniform spray. If not, substitute a nozzle of more efficient design.

A considerable increase in efficiency of the spray pond may be had through "double-spraying". In effect, this is 2 spray ponds operating in series, the pump for the second pond taking suction on the first pond. An existing pond may be converted to double-spray effect by running a dyke across it to separate the pond into 2 halves, suitably manifolding the piping and installing a second pump. Or, it may be more convenient, depending on the individual case, to provide another pond. In winter, when the second effect is not necessary, the dyke may be opened to permit using the whole pond as a single effect, or only one-half the pond if desirable. In any case, suitable manifolding of spray and suction lines would have to be arranged.

Illustrative of the cooling effect double-spraying makes possible is the following example: It is desired to cool 1000 gal. of water per minute from 130°F. to as low a temperature as possible, given a wet-bulb temperature of 70° for the prevailing wind. The present spray pond cools the water from 130°F. to 100°F., a 30° drop. With the same wet-bulb entering-air condition, spraying a second time will reduce the water temperature from 100°F. to 86°F., a 14° drop. Although seldom used, spraying a third time would reduce the temperature a few degrees more, possibly to the neighborhood of 80°F.

Cooling equipment engineers report these simple changes can be effected generally at reasonably low cost per gallon of system capacity. Second-hand equipment can be used or revamped to do the work in nearly all cases.

Deck or Atmospheric Towers

As a general rule, existing deck or atmospheric cooling towers can stand revamping, cooling equipment engineers say. This is true because of the relatively rapid advances made in cooling practice in recent years. They recommend that the manufacturer of the original equipment be called in to suggest changes or alterations, as he is best fitted to know what changes will do the greatest good with the least amount of experimenting.

One thing refinery and natural gasoline plant managers can determine for themselves is whether or not the primary water distribution system is satisfactory. If it contains an old style trough or spray nozzles (Figs. 4 and 5), it can at least be cleaned up, and probably replaced with nozzles and splash plates of modern, more efficient design. (Fig. 6).

Visual examination will in many cases disclose sagging decks and missing slats (Fig. 7). New deck supports may be necessary to restore each of the deck sections to an even plane. Missing slats should be replaced. However, care should be exercised in undertaking such repair work, especially if it will be extensive; the cost of a new tower should be weighed against the cost of restoring (and perhaps modernizing) the old one. This study may indicate it is cheaper to scrap the old one and build a new tower, salvaging the old piping, fittings, and pumps.

Another improvement possibility concerns the maintenance of louvers at least in their original condition. Perhaps the manufacturer has developed a newer and more efficient design which can be adapted to the old tower without great expense. Too often louvers are

Fig. 4—This trough would distribute water more effectively if it were clean. For best performance it should be replaced with spray nozzles

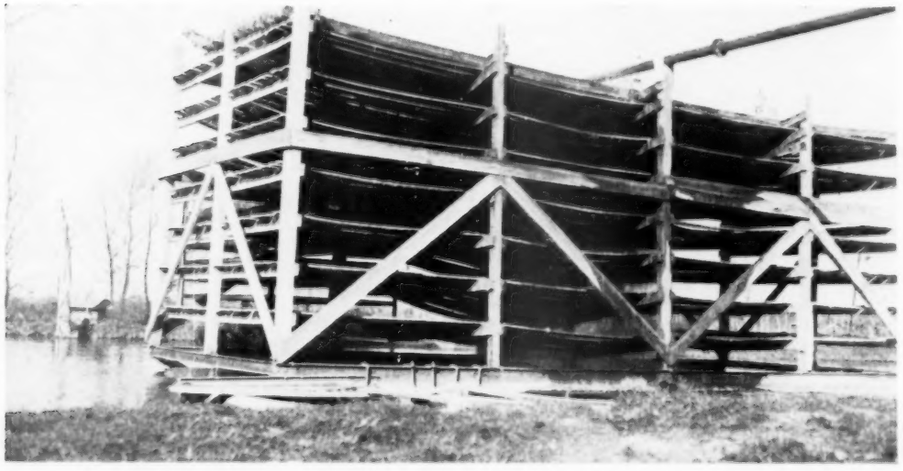


Fig. 7—Decks in this tower have sagged extensively, giving distribution only in the center. Distribution system can stand modernization, too

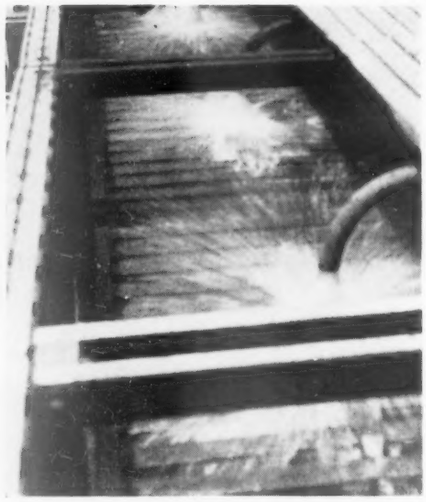


Fig. 5—More efficient spray distribution and better nozzles will help this tower's performance

considered so much "gingerbread", but they have 2 functions: 1—They trap the drift and prevent excessive losses of cooling water; 2—they distribute the incoming "dry" air evenly through the decks of the tower to maintain efficient velocity gradient through the falling water spray.

In a few cases, the height of the tower can be increased to promote longer air-water contact time, but this inevitably causes higher pumping costs, as is shown in Table 1. This table gives unit cost for various periods of time for pumping heads in increments of 5 ft. from 15 ft. to 50 ft., based on assumed cost of 1c per kilowatt-hour at a motor-pump efficiency of 70%.

Another difficulty which may be encountered in increasing tower height is that it may be necessary to rebrace the tower and reframe some of the lower decks. Should investigation prove this necessary, a detailed study should be made of the comparative cost of this operation and the cost of a complete new tower. All too frequently it is not economical to extensively rebuild an old tower.

In the case of a deck tower above a coil shed, the same statements concerning primary distribution, sagging deck construction, louver maintenance and increasing tower height mentioned for a simple deck tower may be said for the more complicated design. In addition, engineers have found that poor secondary distribution—spray over the coils—is an important factor in excess scale formation. If the coils be subjected to alternate wetting and drying, more scale will be deposited than if the coils are kept continuously wet. For this reason, many operators favor near-flooding of coil surfaces to avoid flash evaporation.

Induced Draft Equipment

As a general rule, cooling equipment engineers say that less trouble is encountered in induced draft equipment than in deck towers. Because of the inherent differences in design, the former provides its own draft and the equipment is more modern, since this is a comparatively recent innovation. Where changes are considered the cost is likely to be considerably higher than with deck towers.

Air circulation—and with it evaporation effect—in induced draft towers may be increased by one of two operations: Increasing fan horsepower or increasing the pitch of the fan blades. With electric motors difficult to obtain without high priority ratings, the first method may entail difficulties over delivery unless idle motors of the proper speed happen to be available in the plant. If the second method is used, care must be exercised *not* to load the motor beyond the safe value recommended by the manufacturer. In some instances it is possible to increase blade speed by juggling pulleys (if the unit is belt-driven), but here again caution must be used to not overload the motor or increase blade speed beyond safe values. Any of these operations will increase power costs.

Miscellaneous Operating Kinks

Providing the hot water temperature to a tower specifically does *not* govern the operating efficiency of other plant units, it is possible to secure lower cold water temperature (closer approach to wet-bulb temperature) by increasing the temperature of the water entering the tower. In practice, this is attained by increasing the cooling range through decreased water circulation. For example: Assume 1000 g.p.m. (gal. per minute) to tower at 100°F. and being cooled to 80°F. under

Fig. 3—Spray nozzles are 7 ft. above pond surface, nozzle pressure is 7 lbs. p.s.i. according to recommended practice

present operation. If *good* distribution still can be attained while circulating at 800 g.p.m., the top temperature will reach 105°F. and bottom temperature will fall to 78°F. This is not "pulling rabbits out of a hat" as might at first be supposed, because each gallon of water arrives at a higher temperature, contains more heat, therefore each pound of air has the possibility of leaving at a higher wet-bulb temperature than it did before and consequently removing a greater number of heat units (BTU) per pound of air.

Putting it another way, water evaporates more rapidly (and the cooling effect is greater thereby) at higher temperatures than it does at lower temperatures; and air, also at higher (leaving) temperatures, is capable of holding more water than it can at lower temperatures.

There are several other wrinkles of more or less common application which might be used to advantage. Among these are: Use counter-current flow in exchangers and coils wherever possible. Use a spray pond in series with an atmospheric or induced draft tower, the pond receiving the hottest water—or use two towers in series. Supply coldest water to the equipment needing it the most, using warmer water for other units; this instead of supplying cold water direct to all units.

Table 1—Pumping Cost for Various Water Heads*

(Per 1000 g.p.m.)

Feet of Pumping Head	Cost** 24-hr. day	30-day month	365-day year	5 years	10 years
15	$0.97	$29.10	$354.05	$1770.25	$3540.50
20	1.29	38.70	470.85	2354.25	4708.50
25	1.62	48.60	591.30	2956.50	5913.00
30	1.94	58.20	708.10	3540.50	7081.00
35	2.26	67.80	824.90	4124.50	8249.00
40	2.58	77.40	941.70	4708.50	9417.00
45	2.91	87.30	1062.15	5310.75	10621.50
50	3.23	96.90	1178.95	5894.75	11789.50

*Courtesy The Marley Co.

**Cost of power assumed at 1c per K.W.H., 70% pump and motor efficiency.

Fig. 6—Efficient spray nozzles of modern design as shown here give efficient spray distribution at lower pressures than older types

SIMPLIFICATION ★ A VICTORY AID!

Proven Instruments take up New Tasks!

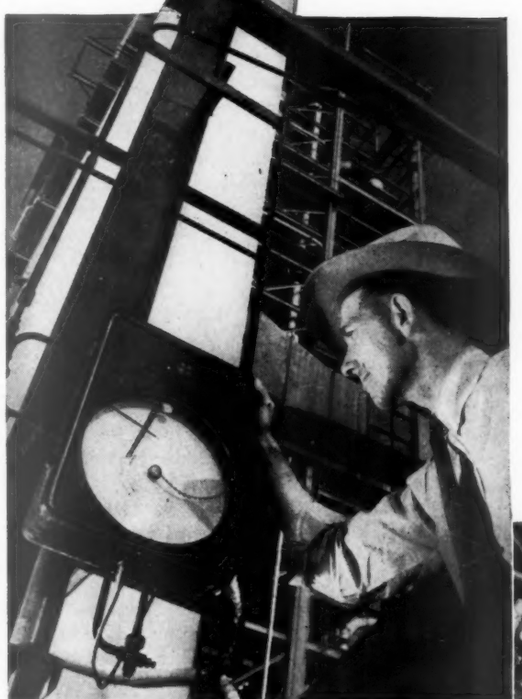
A sidelight on the "miracles" fast shaping in petro-chemical plants . . .

PILOT PLANTS can afford to be daring. But when experimentation passes into full-scale operation, standardization and rigid control rule every phase of production in petro-chemical industries.

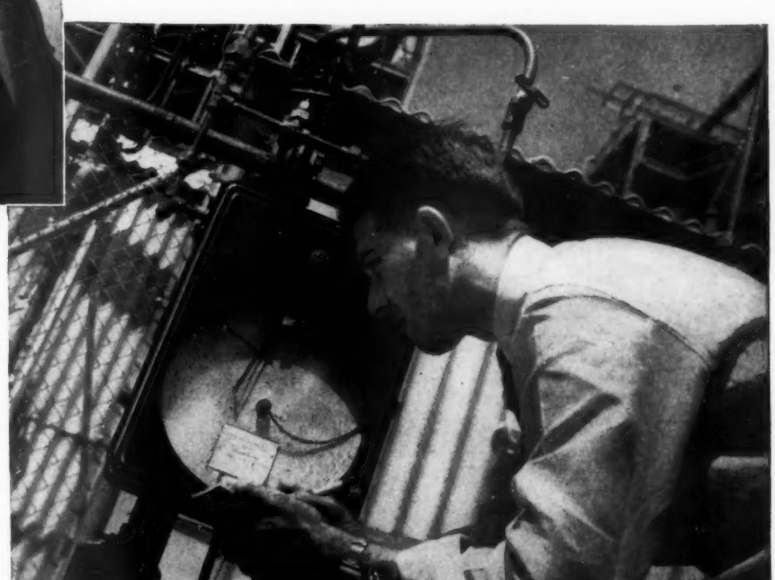
These vital war plants take no chances with untried process equipment or instruments for the sustained accurate measurement and control demanded.

Here are glimpses of a vast new plant devoted to the production of butadiene for synthetic rubber manufacture, as well as an output of 100-octane gasoline and toluol.

The Metric-American orifice meters shown are typical of the plant equipment . . . instruments which have proved themselves in the Petroleum and Gas industries . . . and which give safe assurance of fitness for their present important tasks.



METRIC-AMERICAN orifice meter in the alkylation plant of a subsidiary of a large oil company.



METRIC-AMERICAN orifice meter—with catalytic cracker in background.

METRIC METAL WORKS • ERIE, PENNSYLVANIA

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

MEASUREMENT ENGINEERING AND PROCESS CONTROL

Complete literature is available on the specifications, installation and operation of Metric-American orifice meters, flowmeters and control instruments.

1945

Chemical Descaling of Refinery Heat Exchange Equipment*

Fig. 1—Special X-ray camera for phtographing diffraction spectra of samples of scale from heat exchange equipment. Twelve samples can be "shot" at one time

SCALE accumulations deposited by water or steam in all types of heat exchange equipment can be successfully removed by the careful use of acid-base solvents in a fraction of the time generally required by mechanical cleaning methods. Chemical descaling also has the advantage of removing accumulations to the bare metal. The use of inhibitors in the solvent solution prevents or greatly reduces the corrosion of the metal by the acid.

Advances in chemical treating technique and increased knowledge of the formulae for the solvents best suited for the specific type of scale to be removed, have made this method a practical means for removing scale from boilers, condensers, conventional heat exchangers and water and steam distribution systems.

In brief, the method entails completely filling the vessel to be descaled with the proper type solvent, followed by adequate circulation until the accumulation is dissolved or disintegrated and then washing out the vessel with water. Heat is necessary for the removal of certain types of scale; in other cases application of cold solvent may be sufficient.

In the treatment, careful attention must be paid to the strength of acid, usually hydrochloric, necessary to attack the scale, and inhibiting of the acid may be required to prevent corrosion of the metals commonly used in refinery equipment.

Sometimes it is an advantage to use a combination of acids to dissolve scale composed of silicates and certain types of sulfates. It may be necessary in some instances to use emulsion breakers and foaming agents to secure complete removal of certain types of scale, while surface-tension depressants may be required to secure adequate solvent penetration on extremely dense deposits.

Complete information on the type and composition of scale to be removed is required to determine the proper formula for the solvents. The most practical way to do this is by examination of X-ray diffraction spectra of the scale, when "photographed" by a special "camera" (Fig. 1). Use of this method is possible because scale generally is crystalline in structure and will show characteristic bands and lines similar in appearance to those obtained from an incandescent sample by spectroscope. The method has been described in the literature (1,2,3). By comparison of the X-ray spectrum of the scale (Fig. 2) with the spectra of a number of pure, known compounds, individual components can be detected (4). From the relative intensity of the spectral lines, sufficiently accurate estimation of the quantities of each component can be made (3). Should the scale or some of its components be noncrystalline, they would not be detected by X-ray methods but would be brought out on chemical analysis.

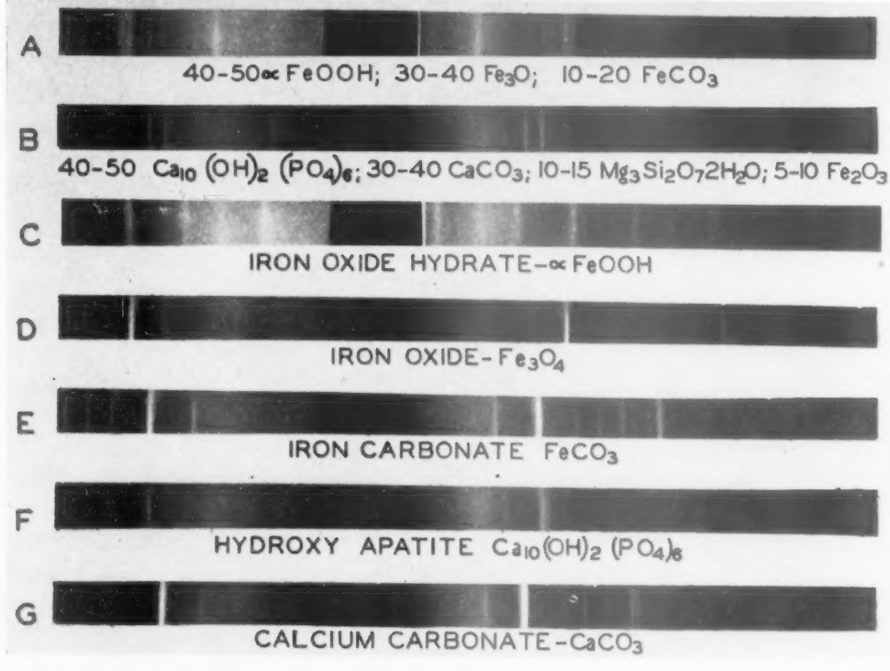


Fig. 2—Typical X-ray diffraction spectra of scale and of known pure compounds

Type of Scale Determines Solvent

Knowing the composition of the scale sample and the metals of which the vessel is constructed, the proper selection of solvents, inhibitors, catalysts, emulsion breakers and surface-tension depressants can be determined. Laboratory examination also determines treating temperature required as well as estimates of quantity of solvent necessary. The latter may be calculated from data on size of the installation to be descaled and average scale thickness as determined on preliminary examination in the field.

Heat losses for various thicknesses and types

* Photographs and data used in the preparation of this article were obtained through the cooperation of engineers of Dowell, Inc., Tulsa, subsidiary of Dow Chemical Co.

Table 1—Heat Losses from Scale Accumulations*

Composition of Scale	Scale Thickness Inches	% Heat Loss
Hard—mostly carbonate	1/50	5.4
Soft—mostly carbonate	1/32	7.2
Hard—mostly sulfate	1/25	9.3
Hard—mostly sulfate	1/20	11.1
Hard—mostly sulfate	1/16	10.8
Soft—mostly carbonate	1/11	15.0
Hard—mostly sulfate	1/9	15.9

*From Bulletin 15, Michigan Department of Health Engineering.

of scale accumulations are shown in Table 1. Table 2 shows some of the common types of scale encountered by one treating company in various locations. (5)

Table 2—Types of Scale Deposits

Name of Scale	X-Ray Analyses	Where Found
Hydroxy-Apatite	$Ca_{10}(OH)_2(PO_4)_6$	Boiler
Pectolite	$4CaONa_2O$ $6SiO_2H_2O$	Condenser
Magnesium Hydroxide	$Mg(OH)_2$	Brine Evaporator
Iron Oxide	Alpha FeOOH	Bubble Tower
Iron Oxide	Fe_3O_4	Oil Cooler
Iron Oxide	Fe_2O_3 H_2O	Poly Plant Cooler
Iron Sulphide	FeS_2	Gas Pipe Line
Magnesium Oxide	MgO	Boiler
Noselite	$Na_8Al_6Si_6O_{24}.SO_4$	Heat Exchanger
Magnesium Silicate	$Mg3Si_2O_7.2H_2O$	Fire Tube Boiler
Analcite	$NaAlSi_6O_6$ H_2O	Water Tube Boiler
Aragonite (Calcium Carbonate)	$CaCO_3$	Evaporator
Calcium Sulphate	$CaSO_4$	Miscellaneous

Table 3 shows experimental data on corrosion of common brasses immersed in raw acid solvent compared with corrosion under the same conditions in inhibited solvent. It will be apparent that even uninhibited acid has only a very moderate corrosion rate on all alloys listed. Addition of inhibitor is demonstrated to have reduced the corrosion rate to an extremely safe value.

The data shows inhibitors will prevent most corrosion from acid. Thus, when trouble is encountered it may usually be attributed to electrolytic corrosion. This may occur when two or more dissimilar metals, such as steel and brass, are immersed in an electrolyte. Treaters' experience indicates, however, that this very seldom occurs at an appreciable rate.

If the rate of corrosion for Admiralty metal be compared with mild and stainless steels, as shown in Table 4, it will be seen that Admiralty metal corrosion rate is approximately 10% of that for mild steel in uninhibited acid. Inhibiting the acid makes it safe to use on stainless steel while the rate for Admiralty virtually is unchanged. The corrosion rate for mild steel also is greatly reduced, even though its reaction rate is somewhat greater than stainless steel.

Table 4—Relative Corrosion Rates of Brass and Steel

(Figures in lbs./sq. ft./day at 150°F.)

	Corrosion Losses In— Raw Acid	Inhibited Acid
Admiralty metal	0.00754	0.0045
Stainless steel	0.594	0.00448
Mild steel	1.232	0.0493

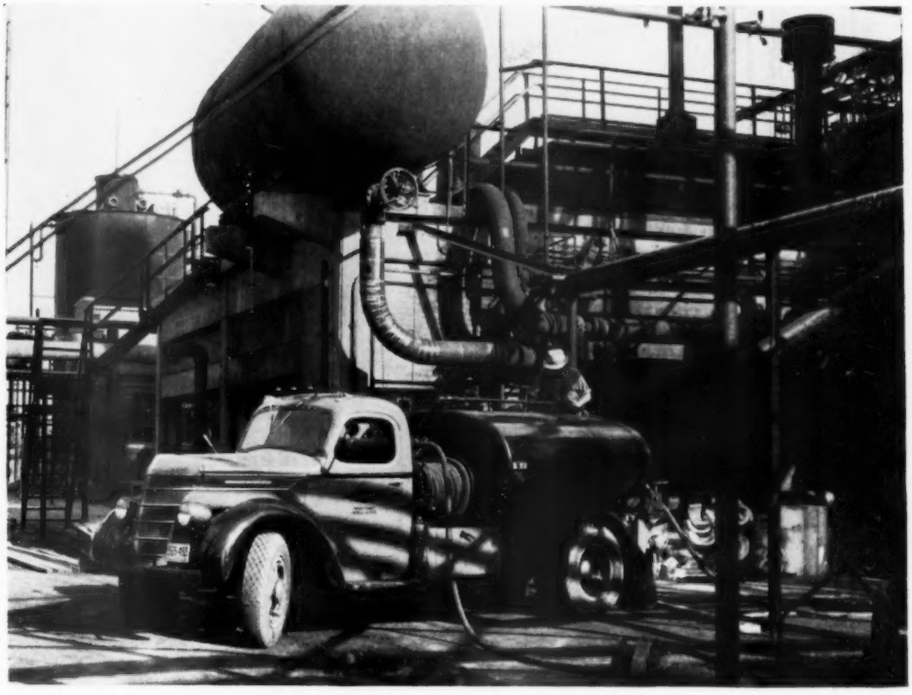


Fig. 3—Setup used in descaling refinery equipment

Descaling Refinery Equipment

Following are interesting case histories of a few descaling jobs performed in several midwestern refineries by a commercial chemical descaling service. (Fig. 3.)

Treating company was called upon to remove scale from the water side of two naphtha coolers and one condenser in a large Mid-Continent refinery. Scale had previously been sent to the laboratory and was reported as very soluble in industrial solvent treating solution known as "XX". This material was used on the treatment under discussion in conjunction with the hot chemical solvent circulation method.

The condenser tubes, numbering 1675, were 4 ft. 6 in. long and held 388 gal. of liquid. The No. 1 naphtha cooler had 290 16-gauge Admiralty metal tubes, 5 ft. 8 in. long, and held 530 gal. The No. 2 naphtha cooler contained 184 16-gauge Admiralty metal tubes with total volume of 504 gal. The coolers and condenser were temporarily connected together to reduce treating time since circulation through the group would require no longer time than circulating a single unit while ultimate volume

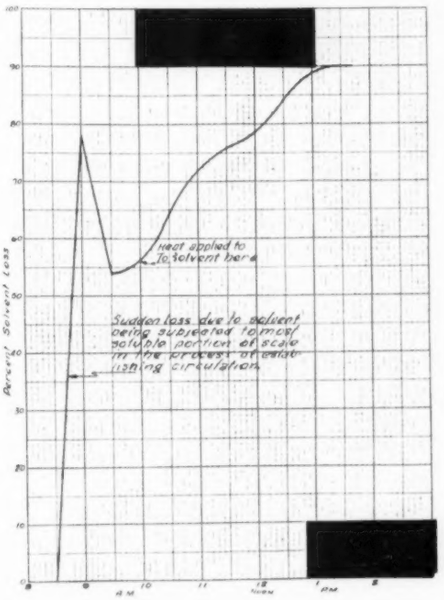

Percent Solvent Loss
Heat applied to solvent here
Sudden loss due to solvent being subjected to most soluble portion of scale in the process of scale loosing circulation
AM
PM

Fig. 4—Time vs. solvent loss curve plotted to determine when reaction of solvent with scale is completed. When the curve flattens out it is indicated the reaction is complete

Table 3—Comparative Corrosion Losses of Brasses in Uninhibited and Inhibited Raw Acid Solvent

Type Brass		Temp. °F.	Type of Acid	Corrosion Loss lbs./sq. ft./day
Admiralty Metal strip		175	Uninhibited	0.0136
Admiralty Metal strip		175	Inhibited	0.0048
Admiralty Metal strip		200	Inhibited	0.0073
Admiralty Metal tube	Sample 1	200	Uninhibited	0.012
Admiralty Metal tube	Sample 1	200	Inhibited	0.0078
Admiralty Metal tube	Sample 2	200	Uninhibited	0.015
Admiralty Metal tube	Sample 2	200	Inhibited	0.0076
Yellow Brass	Sample 1	175	Uninhibited	0.007
Yellow Brass	Sample 1	175	Inhibited	0.0065
Yellow Brass	Sample 2	200	Uninhibited	0.013
Yellow Brass	Sample 2	200	Inhibited	0.0063
Tobin Metal		200	Uninhibited	0.009
Tobin Metal		200	Inhibited	0.007
Muntz Metal		175	Inhibited	0.0038
Muntz Metal		200	Inhibited	0.014
Naval Brass		150	Uninhibited	0.005
Naval Brass		150	Inhibited	0.004

Fig. 5—Extreme right, typical scaled tubing; center, same tubing cleaned by mechanical means; left, tubing after chemical descaling

of solvent would be the same. The solution and equipment necessary for the treatment were brought on location in a specially-equipped truck. A steam solvent header was used to insure constant control over steam flowing into the solvent pump discharge stream, and facilities were provided for periodic solvent sampling and testing of its chemical content.

Cold Solvent Pumped in First

The equipment was first pumped full of the cold solvent and constant circulation established. Steam then was injected into the solvent to raise the temperature to 122° F. and care was taken to avoid creation of excessive strains and stresses in the equipment being descaled. Circulation rate was kept constant at 2 bbls. per minute over the 5¼-hour period necessary for cleaning completely.

When the reaction was completed, as shown by the flattening of the solvent-loss vs. time curve shown in Fig. 4, the equipment was flushed with fresh water and a visual examination made of the conditions within the units. Inspection revealed complete removal of scale with the exception of a few uncleaned tubes at the top of the condenser, the highest point in the system. Solvent had not reached these few upper tubes because the accumulation of reaction gases blocked solvent away from the section; it was not possible to vent this portion because of equipment design. Two tubes were found to be completely plugged and unattacked by the acid because circulation through them was impossible. Very little corrosion from the acid was apparent and job was considered entirely successful by both treating company and customer.

In another case, two submerged coil coolers in tanks 26 ft. long 7 ft. wide, and 7 ft. high, containing 120 2 in. O.D. x 23 ft. long tubes were to be cleaned of carbonate scale approximately 1/16 in. thick. The chemical solvent was sprayed over the tubes. Total of 12 hours was required to complete the work.

Procedure in Cleaning Condenser

A gasoline condenser contained 4000 tubes ¾ in. O.D. and 30 in. long with about ⅛ in. of scale on the inside. Tubes were grouped in 14 passes connected by 28 headers. It would have been necessary to remove all headers to turbine the tubes. The solvent was circulated from bottom to top, but after 5 minutes, reaction was so violent pumping had to be stopped to permit solvent to become spent. This required about 12 minutes, whence pumping was resumed and this cycle was twice repeated before continuous circulation could be established. After treating for 1½ hours, solvent was drained off and the condenser thoroughly flushed with water; one header then was removed for inspection. Tubes were found to be perfectly clean. Two other small coolers then were cleaned the same way.

A refinery boiler was filled with 5000 gals. of special solvent and circulated for an hour and then permitted to stand overnight. Next morning it was drained, flushed and opened for inspection. Interior was found to be free of scale with no evidence of corrosion.

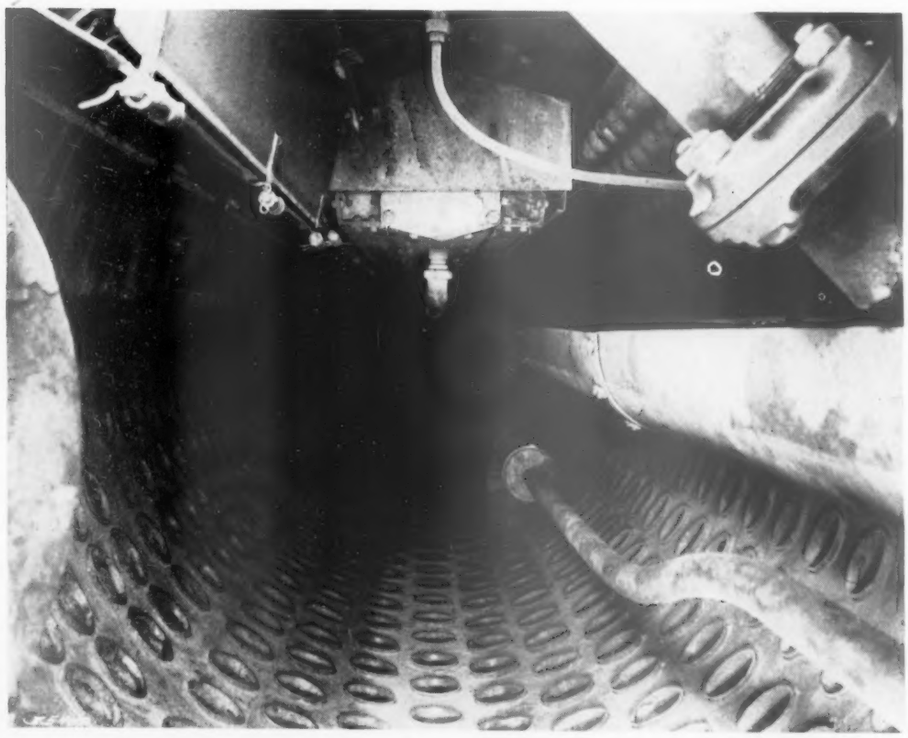


Fig. 6—Boiler after chemical descaling. Boiler was filled about half way up, upper portion being untouched by the solvent

Literature References

(1) Clark G. L., **Applied X-Rays**, 2nd. Ed. (1932)

(2) Hull R. D., J. Am. Chem. Soc., **41**, 1168-75 (1919)

(3) Hanawalt, J. D. et al, Ind. Eng. Chem., **10**, 457-512 (1938)

(4) Imhoff, C. E., and Burkhardt, L. A., Power, Jan. 1943, 64-66

(5) Williams G. F., Power, Jan. 1943, 82-84

Water-Cooled Tube Supports For Oil Tubes in Heaters

TUBES of normal steel cooled by circulating water are being utilized for supports for the oil tubes in various types of heaters in a refinery in Curacao, W. Indies, in place of the usual types of alloy steel supports. This practice is claimed to effect a considerable saving in the critical alloy steels, as even the high chromium-nickel steels frequently have a short life in this service because of the high temperatures to which they are subjected. This use of water-cooled tubes for supports is described in the recent Wartime Plant Design bulletin of the construction section, refining division of the Petroleum Administration for War, from material supplied by T. G. Schad, Asiatic Petroleum Corp.

"In view of the shortage of alloys necessary for the tube supports in various furnaces and the rapid deterioration of these supports, tests were made with special water-cooled supports of normal steel in several types of heaters.

"Water-cooled tubes are suspended by means of hangers made from discarded furnace tubes or in some cases from normal steel. The hangers are protected by two tube halves filled with insulation material.

"We can conclude that this type of support is satisfactory and, under present circumstances, more economical than the previous hangers of alloyed material.

"The design was originally tried out in Dubbs furnaces, where the roof tubes had to be supported by outside roof girders. Four-in. linepipes were used to support each of the 2 rows of roof tubes; the upper 4-in. linepipe was slung from the roof together with insulated strips of Molybdenum steel while the lower 4-in. linepipe was slung from the upper one, also with Molybdenum steel strips. The 4-in. linepipes were connected outside the furnaces so that it was possible to lead a continuous stream of salt water through them, while outside the furnaces inspection covers make it possible to turbine them if necessary. The salt water is controlled in such a way that the outlet temperature is not higher than 50°C. which means that the flow is to be approximately 17 metric tons per hour.

"The supports can be used in several types of furnaces and extra amounts of cooling water can be supplied by extra pump which can draw water from the exit of the coolers of the plant, in which case the main salt water supply will not be affected.

"In order to protect the tubular supports from inside deterioration, plus pressure is to be maintained at the outlet side of the tubes.

"Previous tests proved that rapid inside deterioration was inevitable whilst using free water discharge, probably caused by release of air in the water made possible by the syphoning effect of the discharge line, which creates a vacuum towards the end of the discharging tube.

"To prevent the forming of this vacuum, the construction laid down in sketch No. 1 was used.

"A valve was placed in the outlet to regulate the quantity of water instead of regulating same with a valve at the inlet. A hole of 20 mm. was cut in the valve to be sure of maintaining a continuous flow of cooling water. To effect a + pressure at the outlet, a pressure checking line was installed with a ventpipe; only when a + pressure is present at the outlet is the check line flowing. Should a ventpipe be placed directly in the outlet line, a rapid corrosion of this outlet downcomer could be expected. The checking line can be replaced during operation and is more economical.

"The quantities of water normally flowing through the tube supports of the various heaters are given in Table 1."

Table 1 — Volumes of Water Flowing Through Tube Supports

Plant	Quantity m cu. ft./hr.	Inlet temp. °C	Outlet Temp. °C	Heat Loss percent of input heat at full load	No. of tubes
Dubbs	13.8	30.5	30.5	2.3	2 — 4 in.
Trumble	26.5	31.0	44.0	4.0	4 — 4 in.
H. V. I.	13.5	32.0	47.0	1.5	2 — 4 in.
Trumble	20.7	31.0	54.0	4.0	2.5 in. + 3 in. side tubes
Trumble	45.0	31.0	56.0	2.3	3 — 4 in.

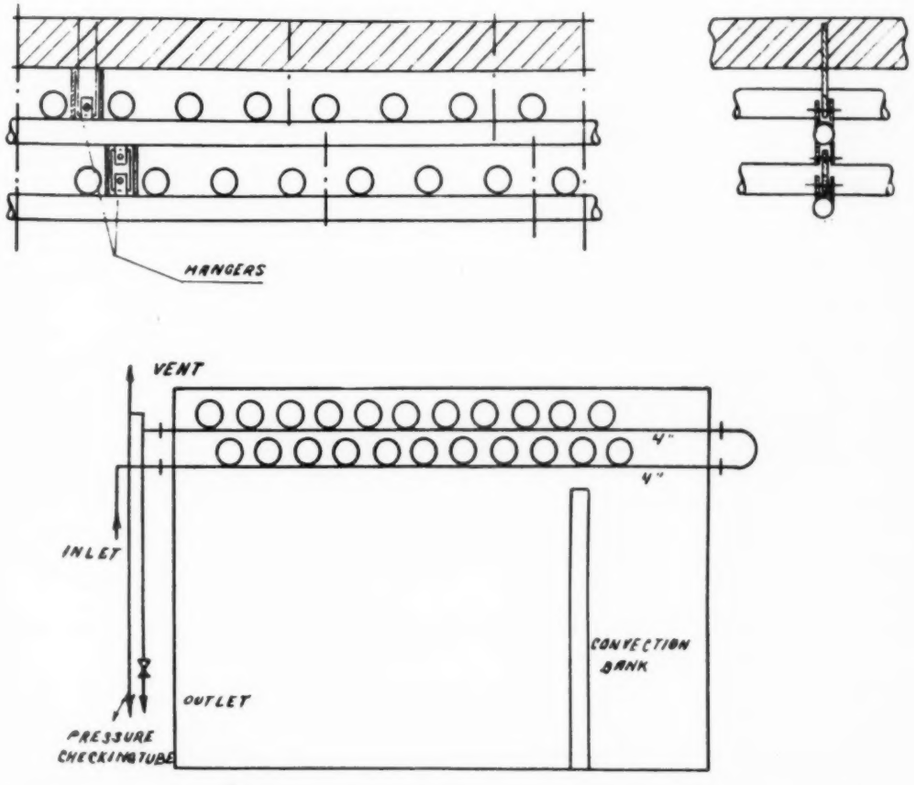
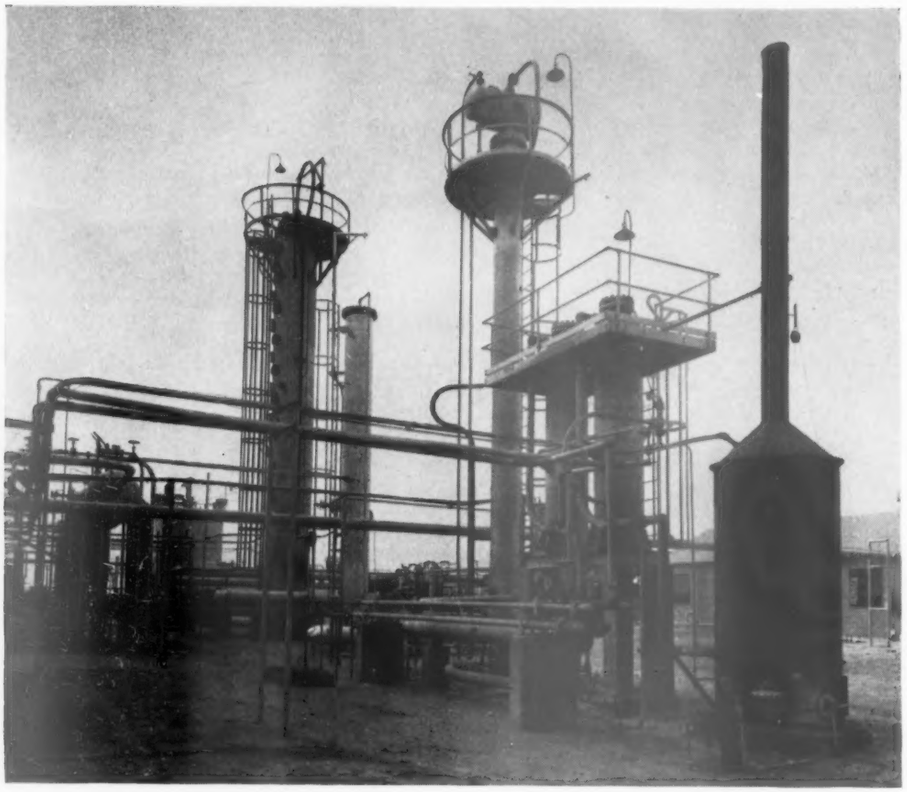


Fig. 1—Design of arrangement of water-cooled tubes for support of oil tubes in Dubbs heater, to replace alloy steel supports

Codimer for Aviation Gasoline Produced In Revamped Catalytic 'Poly' Plant



One of the more recent catalytic polymerization plants installed, of the type being converted in some refineries to produce codimer for aviation gasoline. Under normal operations it would make 45 bbls. a day of polymer gasoline at 10 lbs. Reid vapor pressure. In the foreground, left to right, are the stabilizer, two reactors and heater for the gases, of the "poly" unit. In the background are the fractionating column and stabilizer of the Dubbs cracking unit, the gases from which are used in the polymerization plant (Photo from Universal Oil Products Co.)

REFINERS have been repeatedly urged by government agencies to produce as many components of 100-octane aviation gasoline as possible. However, relatively few plants can economically install the expensive and complicated units to make alkylate, for example, and many materials of construction are difficult to obtain. Moreover, "aviation base" crude is not plentifully available for processing into aviation-grade blending naphtha by conventional methods.

One possibility still remaining for plants with catalytic polymerization units is codimer manufacture. Codimer is an unsaturated product which can be hydrogenated under suitable conditions and thus converted into a blending agent (hydrocodimer) of high octane number in its own right, while still possessing good lead susceptibility. The actual hydrogenation of codimer is a process requiring complicated, expensive equipment. Thus some refiners make codimer and ship it to a central plant for final conversion and blending.

Most plants hydrogenate only for control purposes. This usually is confined to a small laboratory set-up, the products being tested for octane number. Reason is that octane rating of codimer itself bears little relationship to octane number of the hydrogenated product, the actual blending agent. A similar statement can be made concerning lead susceptibility.

How Codimer Is Made

Codimer is a term applied to the product of polymerization of an olefin with itself or another olefin. Codimer as a blending agent in manufacture of 100-octane aviation gasoline is generally understood to mean the product of polymerization of an unsaturated C_3 olefin with itself, or with another C_4 olefin; viz., isobutylene with isobutylene or with one or other of the two normal butylenes—the result being an octylene. Should propylene be present as an impurity—which is frequently the case — a hexylene or heptylene, along with an octylene, probably would result.

One of several commercial catalytic polymerization processes for manufacture of polymer gasoline which can be converted to codimer preparation is that employing a solid phosphoric acid catalyst. This process has been much discussed in the literature, and extensively employed in motor gasoline production, especially by some of the smaller refiners. Polymer gasoline produced has a high octane blending value.

Briefly, the literature describes the unit as consisting of a tube still, one or more catalyst chambers (generally two), and a stabilizer. In normal operations cracking still gases at 500 lbs. per sq. in. are heated in the tube still to 340-400°F., which is adequate to permit a temperature range in the catalyst chambers of 400-450°F. Higher temperatures are avoided to prevent catalyst dehydration and volatilization. Yields of up to 70 gal. gasoline per lb. catalyst have been reported; using pure propene and butene, 90% conversion may be attained. Catalyst life is said to be so great many small plants discard rather than regenerate it.

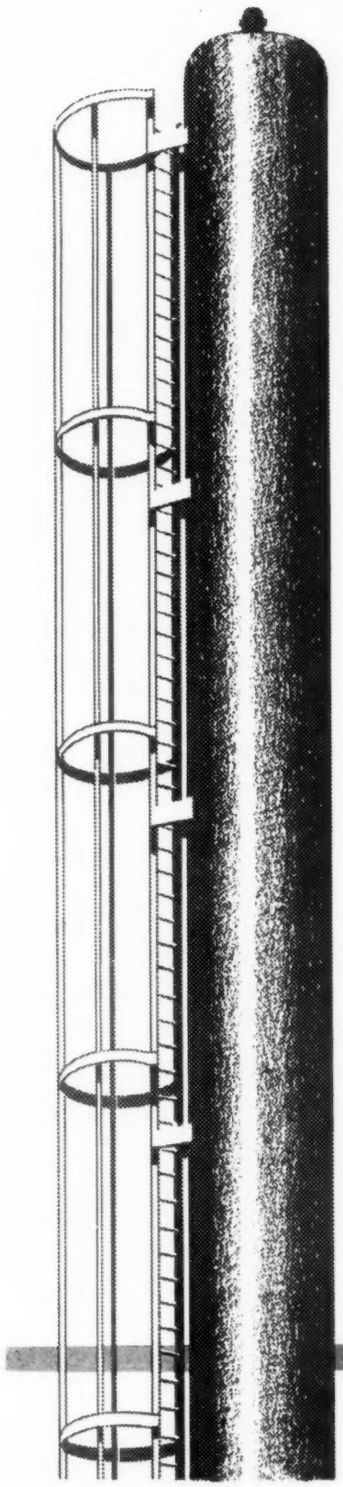
Regeneration is accomplished in place by blowing with air at 650°F. at a rate which will not permit chamber temperature to go higher than 950°F. Revivified catalyst then is hydrated in an atmosphere of 500°F. steam for 10 to 16 hours or more.

The polymerization unit under former operations could be charged with whatever unsaturated gases the refiner produced as a result of his thermal cracking operations, although it was recognized that gases containing propylenes and butylenes gave the greater yields. Neither was it considered necessary to pay strict attention to sulphur compounds as far as the catalyst was concerned. However, for aviation gasoline, of which codimer is a raw material, low sulphur content is important because of the bad effect of sulphur on the metallic catalyst used in hydrogenating the codimer. Further, it has been found that octane rating is lower for codimer produced with propylene.

Therefore, the first requirement for successful manufacture of codimer is to have a special, clean feed, consisting essentially of the C_4 hydrocarbons or butane-butylene cut. It has been found especially important to exclude any of the C_5 hydrocarbons; they definitely increase the yield but lower the finished octane number of the hydrocodimer.

The second important requirement is to provide suitable cooling of the gases in contact with the catalyst, as optimum temperature range for this selective polymerization has been found to be 300-320°F., the reaction being exothermic or heat producing. To avoid undesirable reactions with the catalyst or feed at the low temperatures employed, feed gases must be dehydrated before charging to the heater. The higher the pressure, the better the yield of codimer obtained. Many plants operate at 500 lbs. per sq. in. since they were

WHAT ARE Chemical Grade* LIQUEFIED PETROLEUM GASES?



We are manufacturing Chemical Grade* Liquefied Petroleum Gases to meet the exacting refinery requirements of wartime. Chemical Grade means rigid uniformity—not once, or twice, but always. The properties of Chemical Grade Liquefied Petroleum Gases are fixed, in direct contrast to the variable properties of liquefied petroleum gases for fuel purposes.

Normal Butane, Iso Butane and Propane are the "big 3" of Warren's Chemical Grade family. In them you will find the combination of Warren's modern plant equipment, scientific knowledge, and experienced personnel . . . all working to your benefit.

Yes, Chemical Grade Liquefied Petroleum Gases are in step with today's war conditions. You will find their adoption a solution to your problems, as well as a means of increasing your profits.

* *Copyright 1943 by Warren Petroleum Corporation*

WARREN
PETROLEUM CORPORATION
Tulsa, Oklahoma
Manufacturers, Exporters and Marketers of
Natural Gasoline and Liquefied Petroleum Gas

Export Terminals: Corpus Christi, Port Arthur and Norsworthy, Houston, Texas, Lake Charles, La., and Marcus Hook, Pa.

built originally to withstand this pressure, but there are others that employ pressures as high as 900 lbs. per sq. in.

Revamp Old 'Poly' Unit

One refiner has revamped his old phosphoric acid "poly" unit to make codimer with little "new" equipment required. He does not hydrogenate his codimer except for control measures, but ships it to a 100-octane plant for further processing.

Hydrogen sulfide and low molecular weight mercaptans are best removed from the feed before it enters the polymerization unit, this refiner has found. The old unit had a Girdler tower to remove H_2S, and this was considered adequate for the new process. Because formerly no provision was made to remove the small amount of low molecular weight mercaptans his b-b cut contains, it was necessary to add a sodium hydroxide scrubber so as to produce codimer with not more than 0.05% sulphur content. Two drying towers also were installed to remove water to preclude reaction between water and the catalyst at the low temperatures employed. Although any good drying agent will do, this particular refiner chose fluorite, using two towers in order to permit reactivation of one while the other is on-stream.

It might be mentioned here that, while the actual catalytic reaction is in gaseous phase, this operator customarily recovers his b-b cut in the liquid state. It is converted to the gas phase in the conventional single-coil heater. While admittedly throwing a greater load on the heater, this is reported to be of little actual consequence in operation.

The old "poly" unit was equipped with two towers or catalyst chambers. In order to maintain proper temperature range, this operator packed his towers at their centers with one foot of gravel; this serving to separate the two catalyst charges per chamber and in effect permitting operation as though four catalyst chambers were provided.

The gravel packing acts as a cooling space or quench zone. Recycle from the stabilizer tower—mainly butane and isobutane—is introduced at these points in sufficient volume to assure that temperature of the reactants remains within the optimum range of 300-320°F.

Leaving the last reaction chamber, the polymerized gases are condensed. It only remains, then, for the copolymer to be stabilized to specifications, 2 to 5 lbs. Reid vapor pressure. This is accomplished by debutanizing (and depentanizing if there is any C_5) in the two conventional towers which formed a part of the old unit. In effect, these stabilizers act as one, the second completing the cleaning up begun by the first.

Codimer distillate produced boils between 150-425°F., although the range preferred in producing 100-octane fuel generally is 150-270°F. Fractionation to the latter range is left for the hydrogenation plant to handle. Gases charged to the catalyst including recycle approximate 4.75 gal. per lb. catalyst per day.

Valves for New Plant Cut 27% from Normal

Standard Oil Co. of Ohio has been able to curtail valve requirements in its Houdry unit under construction by 27.3% by redesign and elimination of all but vital valves necessary for the operation of the unit, it is brought out in the latest Wartime Plant Design bulletin issued by Max B. Miller, chief of the construction section, refining division, Petroleum Administration for War, Washington.

"If everyone who is engaged in the erection of war plants in petroleum refineries would curtail the use of valves in the same manner, percentagewise, the dollar value of the valves thus saved would amount to $9,500,000," stated Mr. Miller. The original and present valve requirements for the new Sohio unit are:

Type	Orig. Request Tons	Est. Actual Use Tons
Cast steel	143	97
Cast iron	66	80
Brass	3.2	0.1
Forged steel	19	7
Alloy steel	4.4	0
Cast steel cocks	0	10
Total valve requirements	235.6	194.1

"It is believed without exception that the savings effected have been due entirely to redesign and elimination of valves usually installed for convenience," stated G. W. Hanneken, Cleveland, vice-president, manufacturing department, Standard of Ohio. "Critical alloy steel, brass, forged steel and cast steel valves have been substantially reduced either by eliminating entirely or by substituting cast iron valves."

Expediters of Equipment for Petroleum War Plants

To speed up delivery of materials and equipment for the refining companies' new war plants, a staff of expediters has been set up in the construction section, refining division, Petroleum Administration for War, Washington. These men have been assigned by Max M. Miller, chief of the construction section, to see that the numerous individual items needed for each project are properly scheduled in the manufacturers' shops; also to make sure that essential needs of equipment for replacements and maintenance in wartime refineries are met. They work in cooperation with the different branches of the War Production Board.

These construction section expediters are all located in the offices of the Petroleum Administration for War, New Interior Bldg. Their telephone number is REpublic 1820, the extension for each is noted below, together with the items assigned to each man:

M. Brooks Fitz-Gerald (Extension 3521 or 2263)
- Welding rods and electrodes
- Pressure vessels

H. Clark Goodman (Extension 4023)
- Machine tools

Mylon Jacobs (Extension 2878 or 3405)
- Valves and fittings
  - Bronze valves
  - Iron valves
  - Steel valves
  - Steel fittings

E. E. Kerns (Extension 2821)
- Bearings, ball and roller
- Conveying equipment
- Hand tools
  - Heavy forged tools
  - Wood-working tools
  - Hand service tools
  - Machinists vises
  - Metal cutting tools
  - Precision measuring tools
- Gasoline engines (other than aircraft)
  - 0-35 H. P. (Air cooled)
  - Water cooled, 0-50 H. P.
  - Water cooled, 0-150 H. P.
  - Heavy duty, 150 H. P. and over
  - High speed, over 150 H. P.
  - 50 H. P. and above
- Engine accessories
  - Carburetors for engines of 1000 H. P.
  - Magnetos
  - Fuel injection equipment, one-cylinder pumps
  - Fuel injection equipment, multi-cylinder pumps
  - Fuel injection equipment, nozzles and holders
- Pumps, industrial
- Diesel engines
  - 0-50 H. P.
  - 50-150 H. P.
  - 150-350 H. P.
  - Over 350 H. P.
  - All sizes
- Parker type fittings
  - Includes Weatherhead type
  - Parker and Weatherhead type hydraulic valves

William K. McCoy (Extension 4360 or 3029)
- Amplidynes and selsyns
- Bearings, jewel
  - Vee jewel bearings
  - Large ring jewel bearings
- Control instruments
  - Electrical control
  - Combat control
  - General industrial controls
- Hydraulic parts
  - Hydro-generators above 6000 KW
- Meters
- Vacuum tubes

Raymond Reuter (Extension 4855)
- Optical lenses

V. E. Sicks (Extension 3431)
- Heat exchangers

Robert C. Smith (Extension 2494)
- Extinguishers, carbon dioxide
  - CO_2 used as extinguishing agents
  - Cartridge type, CO_2 used as expellant

Otis J. Thompson (Extension 4046)
- Blowers and fans
  - Including Turbo blowers
- Compressors and vacuum pumps
- Turbo blowers and exhausters

B. Kenneth Wherry (Extension 3176)
- Boilers
  - Central steam heating
  - Steam power generating
- Capacitors, variable
- Capacitors, fixed
- Electric motors, generators and starters
- Gears
  - Aircraft engine
  - Main reduction gears
- Auxiliary turbines
  - Auxiliary land turbines (Generators)
  - Auxiliary land turbines (Mechanical drive)
- Main propulsion turbines

Workers Trained in Refinery Crafts While in Full-Time Plant Jobs

A successful program to train plant employes in craft skills is being carried on by Mid-Continent Petroleum Corp., Tulsa. It was arranged in cooperation with officials of the government-sponsored plan for training workers for war plants.

By this means craftsmen are developed to replace skilled workers who have departed for military service or for other reasons and to meet the general shortage of welders, pipefitters, machinists and other skilled workers. Men who already have had some craft training or experience are polished up and made eligible for other jobs, which is of mutual benefit to the man and the company. Others are helped to select the type of work for which they are best fitted and thus for better-pay jobs. All workers hold down full time jobs while they are training.

Early in 1942, the growing scarcity of skilled craftsmen, including welders, boilermakers, layout men, instrument repair men and pipefitters, began to be severely felt in the large refinery of this company. At this time some employes were attending craft classes given in Tulsa under the Vocational Training Program for Defense Workers, set up by the U. S. Office of Education under federal grant. The oil company decided that a similar program, aimed specifically to meet its own needs, was the best solution for securing more skilled craftsmen.

Some 10 or 15 years before, the company had made available to its employes courses in general refinery practice, accounting procedure, economics of business, business engineering, business arithmetic, etc., at the employe's expense, but it had never before sponsored craft classes. The company personnel department, headed by George F. Bush, then approached local and state directors of the government program to work out arrangements for providing courses in the crafts where skilled workers were most needed.

Any company producing for the war effort which can furnish instructors with the necessary requirements and at least 10, but preferably 20, interested men who are qualified for training, may participate in the vocational training program, it was learned. The company applying must have war contracts or sub contracts and must show that the proposed training is essential for the plant workers to operate at increased efficiency. The company must also show in detail what is to be covered in the desired training courses (an outline of the proposed instruction is generally sufficient). It must also state what instructional equipment will be required, the type of instructor required (necessary experience in the craft or other qualifications) and whether it can supply qualified instructors. Other helpful information in arranging courses is data on any classroom and instructional facilities the company is able to furnish.

Many refining companies may not have a sufficient number of men available and qualified for instruction among its own employes. In these cases, programs may be worked out where oil companies "double up" with some other company or companies having men requiring the same type of instruction. Interested companies can receive assistance from officials of the vocational training plan in their own states in arranging courses.

Under the set-up used by Mid-Continent Petroleum Corp., the furnishing of equipment or financing by the company is not required. However, the company voluntarily furnishes most classrooms and utilities as well as the major portion of the instructional material for many of the classes. It does not furnish welding and machine shop equipment, since both of these departments are operated on a full-staff 24-hour day throughout the week, and equipment cannot be spared for classroom use, but it does supply much of the metal for machineshop practice.

How Trainees Are Selected

The organization preliminaries completed, the company then called to the attention of all employes in the refining division that vocational training classes were to be held. All those interested in improving themselves at government expense were requested to complete an application form from which the potential trainees would be selected. The notice also pointed out that participation was voluntary and not a part of their company duties.

The application form for craftsmanship training requires the applicant to list his years of attendance in grammar school, high school, college and any supplementary class training. It asks him to select the craft in which he is most interested and give any experience he has had at such craft. It also asks him to name his principal hobby, which may be a key to the aptitude of the application for the craft he has selected.

Trainee applications are passed upon by representatives of Mid-Continent's personnel department sitting with the instructors. Basis of selection is that trainees must possess the background, or be on a job, where the training offered will be of greatest benefit both to applicant and company. Scarcity of men in a given craft also is a determining factor. Usually at least one of the instructors present or the personnel officer will know each applicant personally and have some knowledge of his ability and aptitude. If possible, the man is placed in the class of his first choice. However, if in the opinion of the instructors he may not be ready yet for the experience he wishes to receive, he may first be placed in some other class for preliminary instruction. Also, men "farthest along" in experience and educational background are taken first, since they will complete the most advanced training offered with the least amount of instruction.

The following are examples of situations encountered by this company in the organization of its craftsmanship training classes:

Some still operators wanted to take a course in instrument repair, maintenance and installation because they use these instruments each day. This was not granted because these men would not be eligible for up-grading or to become instrument repairmen. Instead, they might be tempted to "fiddle" with the instruments rather than call the repair department — a very undesirable situation.

A sample jerker who had some machine shop experience and who volunteered would be given machine shop training and then would be transferred to work in the machine shop.

A chemist would not be permitted to take craft training for it would not fit in with his duties. On the other hand, an engineer-draftsman would be permitted to take certain craft courses on the grounds that such instruction

One of the Mid-Continent Petroleum Corp.'s students in machine shop practice "brushing up" on lathe work. Starting as a laborer in 1934 this man successively became machinist's helper, pump repairman and now is a pump inspector. He has completed a correspondence petroleum training course and a machine shop course since joining the company

Table 1—Outline of 7 Courses in Craftsmanship Training Provided for Employes by the Mid-Continent Petroleum Corp.

Pipefitting Course
(Instructor is a company pipefitter)

1—Use of working prints, isometric plans and elevations
2—How to compile a materials list from a working print
3—Review of mathematics
4—How to bend pipe
5—How to figure and make offsets
6—The proper use of valves
7—Reaction of chemicals on metals used in industrial piping
8—Use of screw pipe fittings
9—Use of welded pipe fittings
10—Expansion and contraction of pipe

Instrument Repair Course
(Instructor is a company planning engineer)

1—Pressure and vacuum gauge
2—Indicating and recording thermometers
3—High temperature pyrometry
4—Theory of differential-pressure flow meter
5—Volumetric flow meters
6—Liquid level measurement
7—Automatic control theory
8—Automatic control mechanisms
9—Telemetering
10—Miscellaneous industrial instruments

Arc Welding Practice Course
(Instructor is company Class A welder)

Group 1 Exercises—welding in flat position
Exercises in this group are designed to instruct in technique of making bead, fillet and groove welds in the flat position
Group 2 Exercises—welding in horizontal position
Included are bead welds, single-pass fillet welds, multiple-pass fillet welds and groove welds
Group 3 Exercises—welding in vertical position
Same welds covered as in Group 2
Group 4 Exercises—welding in overhead position
Same welds covered as in Group 2
Check tests for all groups require the students to make welds in each group meeting specified requirements for contour, extent of fusion, and soundness
Students in this course are also instructed in care and operation of welding machines

Welding Technique Course
(Instructor is company Class A welder)

1—Technical welding terms explained
2—Description of latest welding equipment
3—What a welder should know before doing a welding job (Explanation of various welding codes. Preparation of plates and sections for welding.)
4—Costs and how to figure them
5—Heat treatments
6—Effect of welding on grain structure of parent metal
7—Quenching effect on mild and alloy steels
8—Testing weldments

Shop Mathematics and Blue Print Reading Course
(Instructor is foreman of reclamation department)

1—Reading and writing numbers
2—Fractions
3—Decimals
4—Percentage
5—Mensuration
6—Shop mathematics
Threading
Gearing
Linear measurements
Square measurements
Estimating weights
Estimating stresses
Shop layout of—
Keyways
Splines
Squares
Sprockets
7—Blue print reading
Types of drawings
Reading shapes of objects from drawings
How dimensions are shown
General blue print reading
Common symbols
Scales of drawings
8—Reading blue prints of objects by the shadow method
9—Training the mind to read shape on blue prints
10—Reading blue prints of piping systems, of welding industry, of general construction projects

Machine Shop Practice Course
(Instructor is company machinist)

1—Lathe practice
2—Milling machines
3—Shaper
4—Drill press

Course in Pipe Layout for Welding Operators
(Company Class A welder is instructor)

1—Study of pipe dimensions
2—Fabrication of various turns
3—Fabrication of varied degree branches on pipe of equal diameter
4—Fabrication of varied degree branches on pipe of unequal diameter
5—Fabrication of the two types of "Ys" on pipe of equal diameter
6—Fabrication of the two types of "Ys" on pipe of unequal diameter
7—Fabrication of varied types of heads
8—Fabrication of varied types of reducers

would enable him to lay out more practical designs in his blue prints.

The instructors are chosen by the heads of departments in which they work. Usually a foreman is selected, although this is not necessarily the case; certainly he must be an "old head" in the craft. This automatically assures meeting the minimum qualifications set by the government calling for an instructor to be at least 24 years of age, to have a high-school education and "several years practical experience in the line of work to be taught". In some cases, generally depending on the applicant's experience, the educational requirement may be waived. Mid-Continent instructors generally are far better qualified than the minimum experience requirement.

At the present time, instructors are not required to undergo instruction in craft pedagogy although, according to federal training program officials, this may become a requirement before the end of 1943.

The requirement is contemplated, they say, because it is relatively easy to make a professional craftsman into a teacher; it would take a comparatively long time to make a professional teacher into a craftsman so he could teach that craft.

At present, vocational training supervisors work with the instructors as the need develops for instruction in the fundamental principles of pedagogy.

Courses Offered

Seven courses are now offered Mid-Continent's refinery division employes: in pipefitting, instrument repair, arc welding practice, welding technique, shop mathematics and blue print reading, machine shop practice, and pipe layout for welding operators. A class in two-way radio operation, which will include maintenance and emergency repair, also is contemplated for plant guards, who use this equipment in their routine daily work. Table 1 gives an outline of instruction for the courses now being offered, as prepared by individual instructors.

Although not specifically noted in the outlines, provision is included in each course for instruction and emphasis on safe practice to preclude injury to the workman or others. Informal lectures and discussions relating to safety are a regular part of the work of every department in the plant. Each week the plant safety director calls on all departments, stopping the work for a few minutes to have the men consider the safest way to do their daily jobs. From time to time, general safety lectures also are given at mass meetings, to supplement safety instruction by departments. Moreover, each new employe, before he goes on the job, receives individual or group safety instruction as the case may require. Because of the emphasis on safety practices in the plant, it was felt less attention could be paid to this subject in the training courses.

Results of Training

First 8 weeks period of craft instruction for Mid-Continent Petroleum Corp. employes ended recently. Of the 150 men who entered, approximately 22% dropped out, mainly because of the draft, but some by accepting employment elsewhere. The balance either have completed the most advanced training given or will continue their present classes receiving more advanced instruction. This latter is encouraged, for it is recognized that it takes more than 8 weeks' instruction to make a craftsman.

Average overall attendance was 10 men per class meeting, with the average class enrollment ranging from 15 to 22. Illness, job assignments and other unforeseen developments generally were responsible for the dropping off, plus the effect of the 22% "mortality rate", which of course affected some classes more than others. The company instructors and vocational training officials expressed themselves as well satisfied with the results and are arranging equipment, facilities and re-enrollment for the second 8-weeks period.

One of Mid-Continent's instructors estimates that 200 men he has kept in touch with over the country are now drawing 100% more than they would have been paid if they had not undergone this type of vocational instruction. The companies for which they work are receiving an equivalent benefit in improved efficiency of the workers.

The company also has a plant protection school, taught by an Army officer for the benefit of the plant guards. While set up somewhat on the same basis as the vocational training courses, details of instructional subjects are considered military information and cannot be published now.

Management of the government-sponsored vocational training program in Oklahoma is under the direction of M. L. Powers, state supervisor of trade and industrial education, and J. B. Perkey, state director of vocational education, both with offices at Oklahoma Agriculture and Mechanical College campus in Stillwater. Local directors in Tulsa were R. B. McHenry, Director of Vocational Education, and H. A. Allender, Vocational Training Supervisor, both of Tulsa Public Schools. For the benefit of oil companies in other states who may be considering similar craft training courses, there are the same offices in other states. The officials can be contacted through local public schools. Dr. L. S. Hawkins, Director of Training for War Industries, U. S. Office of Education, Washington, will supply information and assistance on request.

NEW!
A
BEAD
Synthetic
CATALYST
★
13% TO 30% INCREASED
YIELDS OF AVIATION
GASOLINE BASE STOCK
★
23% TO 35% INCREASED
POWER OUTPUT

Announcing

T.C.C.

BEAD Synthetic CATALYST

- **improves performance of Houdry and T. C. C. Units* beyond any catalytic operation known to date**
- **actual cost in commercial operation is lower than that of any other catalyst**
- **exceptional catalyst activity with very little loss in service**
- **far greater strength and resistance to wear than other catalysts**

*All twenty-two T.C.C. Units under construction were designed and are being built by Lummus. Licensed by Houdry Process Corporation.

INCREASE IN AVIATION GASOLINE YIELDS WITH T.C.C. BEAD CATALYST

	Clay or Best Present Day Catalyst	T.C.C. Synthetic Beads	% Relative Increase in Yield from Beads
Stock A — Mixed Base Type	100	113	13%
Stock B — Naphthenic Type	100	125	25%
Stock C — Paraffinic Type	100	130	30%

INCREASED POWER OUTPUT, SUPERCHARGED ENGINES

	Best Present Process	T.C.C. Synthetic Beads	% Increase
Fuel A — Mixed Base Type	100 H.P.	126 H.P.	26
Fuel B — Naphthenic Type	100 H.P.	135 H.P.	35
Fuel C — Paraffinic Type	100 H.P.	123 H.P.	23

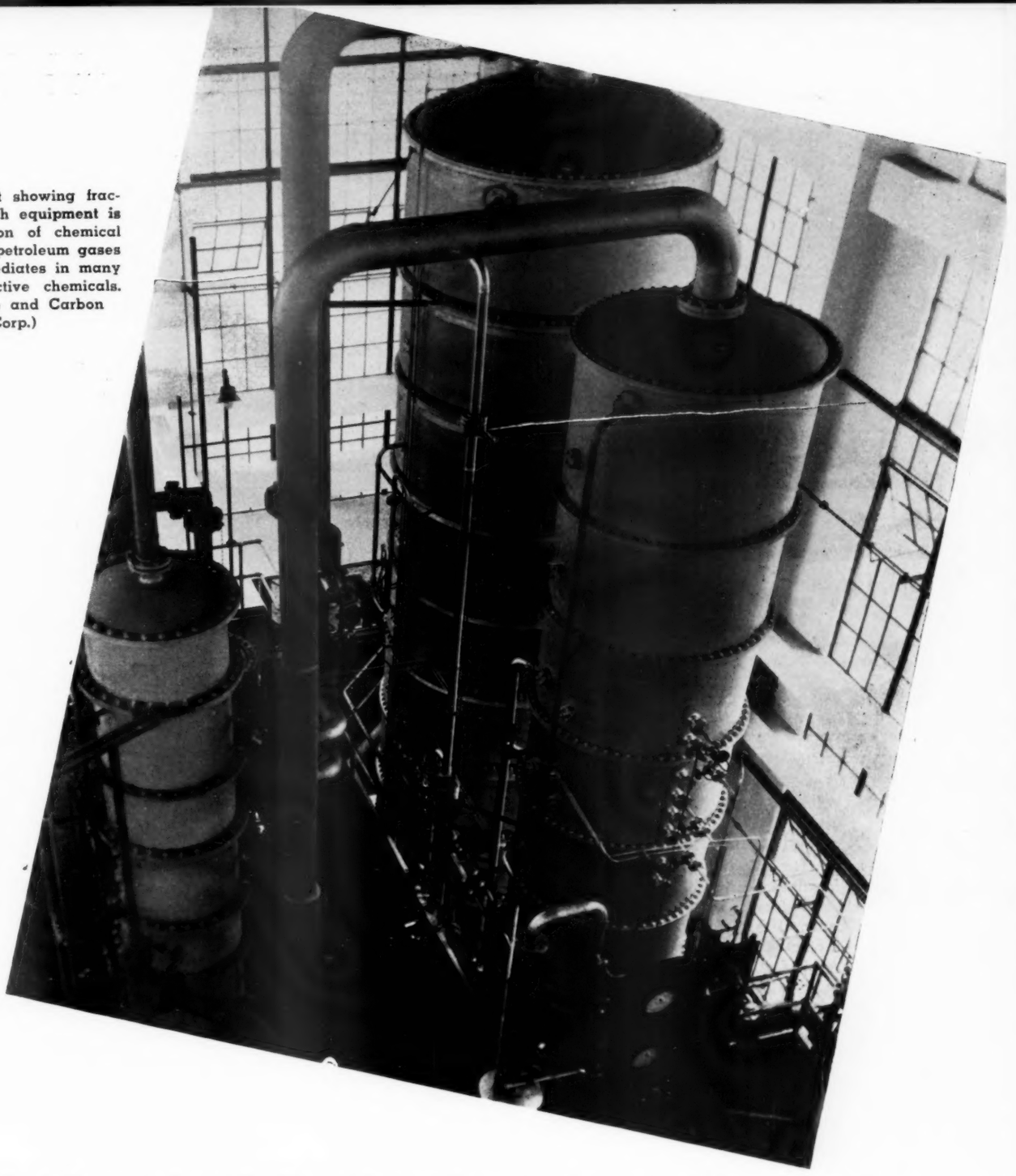
Resulting in

13% to 30% increased production of an improved quality product from a given plant. 23% to 35% increase in power output.

THE LUMMUS COMPANY
420 Lexington Ave., New York, N.Y.
600 South Michigan Avenue, Chicago, Ill.
Florida, 671, Buenos Aires, Argentina
634 So. Spring Street, Los Angeles, Calif.
70 Barn Hill, Wembley Park, Middlesex, England

LUMMUS

PETROLEUM REFINING PLANTS



Typical distillation unit showing fractionating columns. Such equipment is used in the purification of chemical derivatives of cracked petroleum gases which serve as intermediates in many of the new surface-active chemicals. (Courtesy of Carbide and Carbon Chemicals Corp.)

ABC of Chemical Derivatives from Petroleum

V. Detergents and Lubricants

By R. L. Wakeman [1] and B. H. Weil [2]

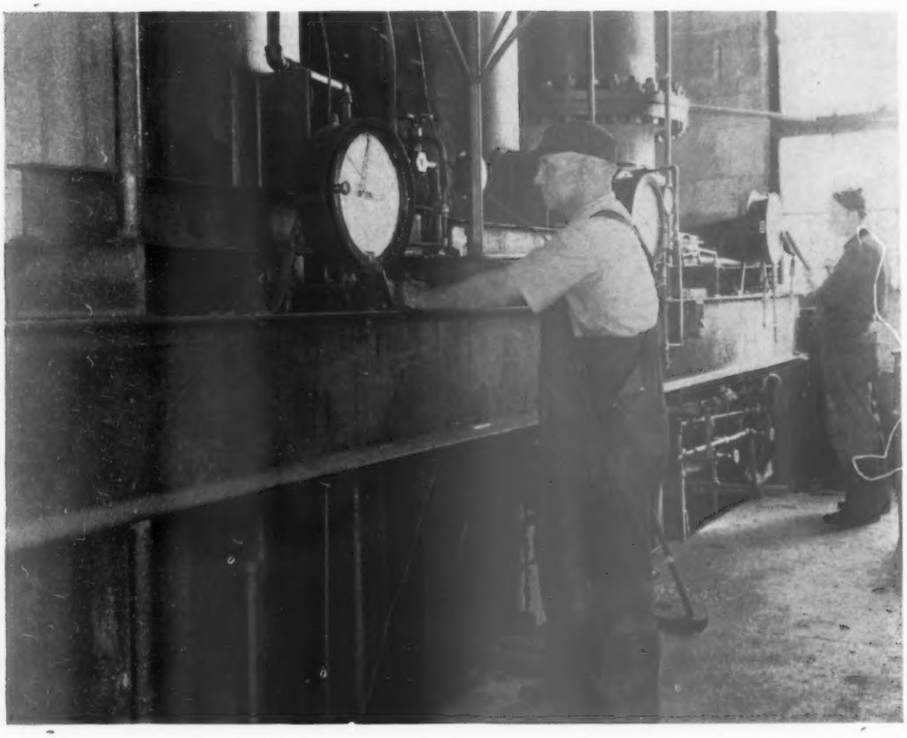
"Cleanliness is indeed next to godliness."
—John Wesley

EVEN in the days of John Wesley, the business of keeping clean was so important that impressive soap-making factories were firmly established in Europe, and the foundations of modern American chemical industry were being laid in Colonial soap plants. Indeed, the saponification of fats and oils to produce soap was one of the earliest chemical manufactures established anywhere in the world, being practiced for centuries before the masterful studies of the great French chemist, Chevreul, began to throw light upon the fundamental nature of these essential products.

The development of cleaning agents throughout the ages is a fascinating tale of evolution from ash alkalies—the "sope" of Jeremiah and Malachi—to English fuller's earth, so highly prized that its exportation was deemed a felonious crime; from the suave soaps of Marseilles, Venice, and Savona—whence the French word, *savon*—to the synthetic detergents of 1943, which are indispensable to 20th century industry!

The groundwork for the development of modern detergents was laid during the rapid rise of the dyestuffs industry in the latter half of the past century. As a result of the increased demand for Turkey reds, produced by applica-

[1]Pittsburgh Equitable Meter Co.'s Industrial Fellowship, Mellon Institute, Pittsburgh.
[2]Chemistry Division, Gulf Research & Development Co., Pittsburgh.



Plant equipment for the oxidation of hydrocarbons by the Burwell process. The products are mixtures of acids ranging from C_3 to C_{24}, together with their esters and a variety of other oxygenated compounds. Their character can be controlled by selection of starting materials and appropriate treatment of the oxidation mass. (Courtesy of the Alox Corp.)

tion of alizarin to suitably mordanted fabrics, it was found that castor oil treated with sulfuric acid served as an excellent assistant in the application of these colors, so that sulfonated castor oil came to be known as Turkey red oil. Its field of utility as a dyeing assistant was extended widely with the expansion of the coal-tar dye industry.

Early in the 20th century, an American chemist, Twitchell, found that sulfonated condensation products of oleic acid and coal-tar chemicals like benzene, naphthalene, and phenol, could be used to split fats, in part because of their emulsifying action. A few years later, the first synthetic tanning agents were developed in England. They were produced by reacting sulfuric acid with complex condensation products of formaldehyde and phenol or cresols—products which resembled the initial intermediates of phenolic resin formation.

During World War I, stocks of fats and oils were so depleted in Germany that soaps were heavily loaded with all manner of fillers, many of them, like salt, serving simply as inert extenders. Some of them, however, possessed limited detergent power, although all were decidedly inferior to soap. Among the beneficial fillers were a few derived from coal-tar chemicals, notably naphthalene, by reaction with sulfuric acid.

With the development of refining techniques in petroleum technology came such sulfonated by-products as mahogany and green acids. Attempts to utilize these waste materials led to limited applications as emulsifying agents and fat-splitting compositions.

Thus there was acquired a mass of seemingly unrelated facts in the field of detergents and allied products, but their relationship was often obscure because of the chemical complexity of many of the compositions developed. By 1925, however, it had become possible to discern a few basic principles underlying these innumerable details. Once these fundamentals were perceived, chemical industry was quick to seize upon them, and during the past decade there blossomed forth an almost incredible number of wetting agents, foaming agents, dispersing agents, detergents, emulsifiers, dyeing assistants, insecticides, tanning agents, textile treating agents, and analogous compositions, now all classed together under the generic name of surface-active agents.

The commercial application of all these chemicals is based largely upon one physical necessity; namely, that of effecting intimate contact between water and another substance —solid, liquid, or gaseous—which is insoluble in water, or, at best, not readily miscible with it.

Soaps

For a long time it was supposed that the cleaning or detergent action of soaps could be attributed to their slight alkalinity. It is now conceded generally that such an effect is purely incidental. Many of the most powerful among the newer detergents are not alkaline at all. Upon what, then, is the cleaning action of soaps based? Soaps are all salts of higher fatty acids and a metal or metal-like substance; they possess the general formula $R\text{-}C(=O)\text{-}O\text{-}M$, where M represents a metal or analogous material and R is a long chain of carbon atoms, usually containing from 11 to 17 individual members. Hydrogen, of course, is attached to each carbon atom to satisfy its four bonds. Double bonds may or may not be present. While the latter determine, to some extent, whether or not the soap will be liquid or solid, they have little effect upon its cleaning action. Many of the finest toilet soaps are produced by saponifying coconut oil with caustic soda. Although a number of different acids are chemically combined with glycerol in coconut oil, the principal components of soaps derived therefrom can be represented by the following formula:

$$H_3C\text{-}(CH_2)_{10}\text{-}C(=O)\text{-}O\text{-}Na.$$

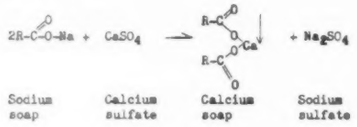
The long carbon chain of this compound, which bears the chemical name of sodium dodecylate, is similar in its architectural structure to the substances composing fats, oils, waxes, and greases, in which it therefore tends to dissolve. On the other hand, it is water-repellent or hydrophobic.

The $-C(=O)\text{-}O\text{-}Na$ group, however, is more mineral than organic in nature and is hydrophyllic. It can be compared, for example, with washing soda, $Na\text{-}O\text{-}C(=O)\text{-}O\text{-}Na$, or table salt, Na-Cl, both of which are readily soluble in water but do not dissolve in fats, oils, waxes, and greases. Hence, if compounds of this nature are dissolved in water and the solution is placed in contact with a fat, oil, wax, or grease, the long carbon tails of those dissolved molecules which happen to be near the fatty matter have a tendency to dissolve in the latter, in preference to water, while their carboxylic heads, $-C(=O)\text{-}O\text{-}Na$, remain in the aqueous phase.

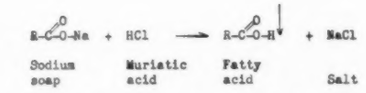
This situation makes for dispersion of the fatty material in the water, in the form of minute suspended particles. Thus, a greasy surface washed with a soap solution is cleaned because the grease is literally carried away into the water by the dissolved soap which cannot make up its mind with which medium it prefers to be associated—water or grease. A greatly magnified globule of grease, dispersed in an aqueous soap solution, might be represented as follows:

The same general principle applies to the mechanism whereby all surface-active agents accomplish the work for which they are intended, whether they be detergents, emulsifying agents, wetting agents, or other types of industrial chemicals. It should be noted at this point, however, that a surface-active agent is not equally effective for all kinds of work. Some are better foaming agents than detergents; some better emulsifiers than wetting agents. Hence the great variety of commercial products. For example, it has usually been found that the best wetting agents of a given chemical type possess fewer carbon atoms than the best detergents of the same chemical class.

It is well known that most ordinary soaps are not active in hard water. The reason for this lies in the fact that while soaps of sodium, potassium, and certain other metals are soluble in water, those of calcium and magnesium are not. Hard water contains dissolved salts of calcium or magnesium which react with sodium or potassium soaps to yield insoluble curds of the corresponding calcium or magnesium soap:



Likewise, many of the higher fatty acids from which soaps are made are insoluble in water, so that if a soap is dissolved in an aqueous solution of a soluble acid, like acetic or muriatic, precipitation of its fatty acid components occurs in the following manner:



Recent developments in the field of surface-active agents, therefore, have been directed not only toward the preparation of highly effective detergents, wetting agents, and comparable products, but also toward the production of materials which will retain their efficiency in hard water and in the presence of either acids or bases.

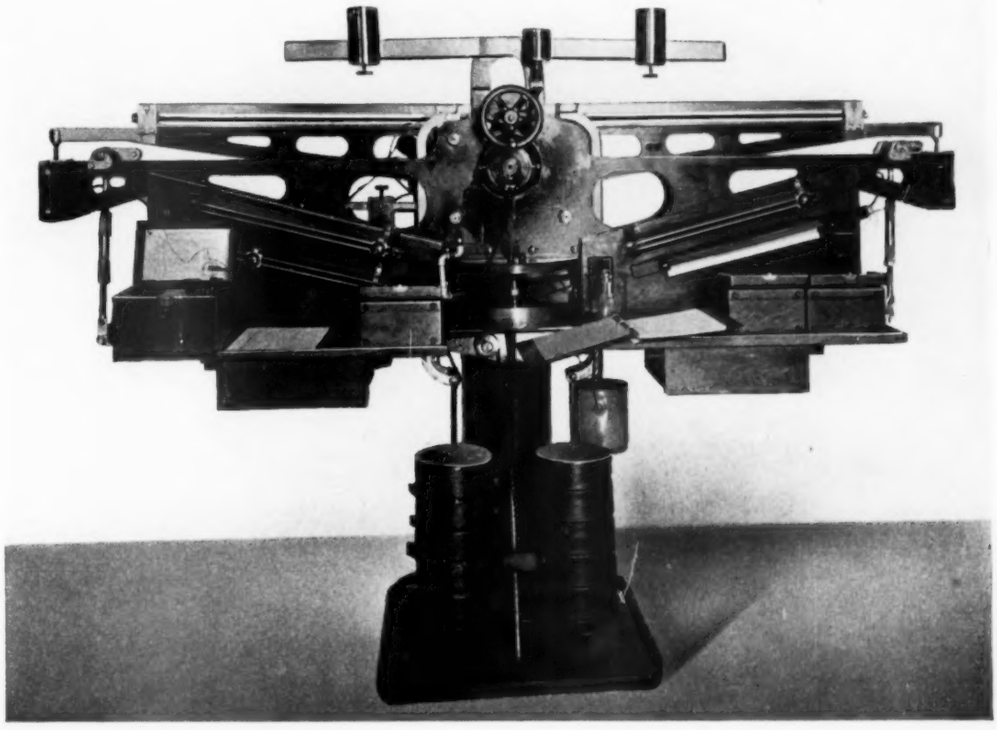
The above picturization of the soap molecule is somewhat more simple than is actually the case. For one thing, the $-C(=O)-O-Na$ group does not exist as such in aqueous solution. Like most other salts, soaps are split up to a considerable extent into two separate groups where dissolved in water. Each group bears an electrical charge, one being positive, the other negative. As with all such salts, these two groups are called ions. They exist in a state independent of each other only in aqueous solution. If a negative charge is indicated by $\ominus$, and a positive by $\oplus$, then the two ions into which a soap molecule is divided upon solution in water can be represented by $R-C(=O)-O^{\ominus}$ and $Na^{\oplus}$.

The first of these two groups, being negatively charged, migrates towards the anode or positive electrode if an electric current is passed through the solution; it therefore is called an anion. The $Na^{\oplus}$ migrates toward the cathode under the same conditions and accordingly is called a cation. As the anion, $R-C(=O)-O^{\ominus}$ is the surface-active part of a soap solution, soaps are anionic detergents. There are many other anionic-surface active agents besides soaps, all characterized by the fact that where they dissolve in water it is the anion that is the surface-active constituent. On the other hand, a number of surface-active agents have relatively inactive anions combined with surface-active cations. These products fall in the general category of cationic surface-active agents.

Anionic Surface-Active Agents

It is possible to represent the essential components of most surface-active agents by the general formula R-X-Y. In those of anionic nature, the ions are $R\text{-}X^{\ominus}$ and $Y^{\oplus}$. R is an organic radical which may be of almost any degree of complexity, R and X together ordinarily containing between 8 and 22 atoms of carbon. Hydrogen is also present in R, and other elements such as oxygen may or may not be there. X is a group capable of acquiring a negative electrical charge upon solution in water. Y is hydrogen, a metal, or a metal-like complex.

In this general formula for anionic agents, X is usually one of three groups, namely: $-C(=O)-O-$, $-S(=O)(=O)-O-$, or $-O-S(=O)(=O)-O-$, where S represents a sulfur atom. These groups are the characteristic segments of the so-called carboxyl, sulfonic acid, and sulfate groups. Much more rarely, boron or phosphorus may also be present in X. While all soaps contain carboxyl groups, most of the newer anionic surface-ac-

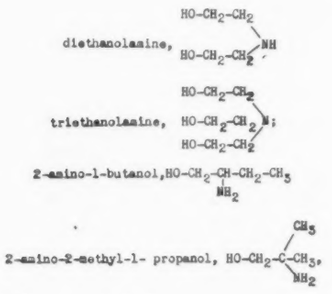


Lubarometer utilized in studying the lubricating ability of oils under varying conditions of pressure and temperature. This instrument, used in the development of "Alox Compounds", is fundamentally a modification of one devised by Moore and Carvin. (Courtesy of the Alox Corp.)

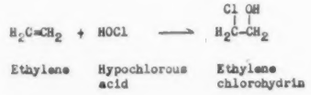
tive agents are constituted, in part, of one or more sulfonic acid or sulfate radicals.

It is in the development of those parts of anionic surface-active agents designated as R and Y that petroleum and natural gas play a role as sources of raw materials.

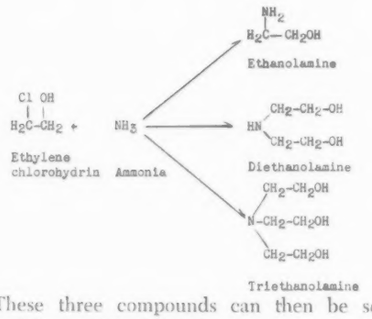
Ordinarily, Y is sodium. Occasionally it may be another metal, the ammonium radical ($-NH_4$), or hydrogen. There is now, however, a number of important wetting agents, emulsifiers, and detergents, in which Y is a complex amino group occurring in certain chemicals derived from petroleum. Particularly valuable are the soaps produced by reaction of the usual fatty acids among a number of other related compounds:



The first two of these compounds are derived from ethylene. By reaction with hypochlorous acid, HOCl, ethylene chlorohydrin results:



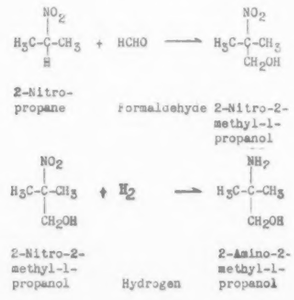
This compound is reacted with ammonia, whereby all three possible ethanolamines are produced:

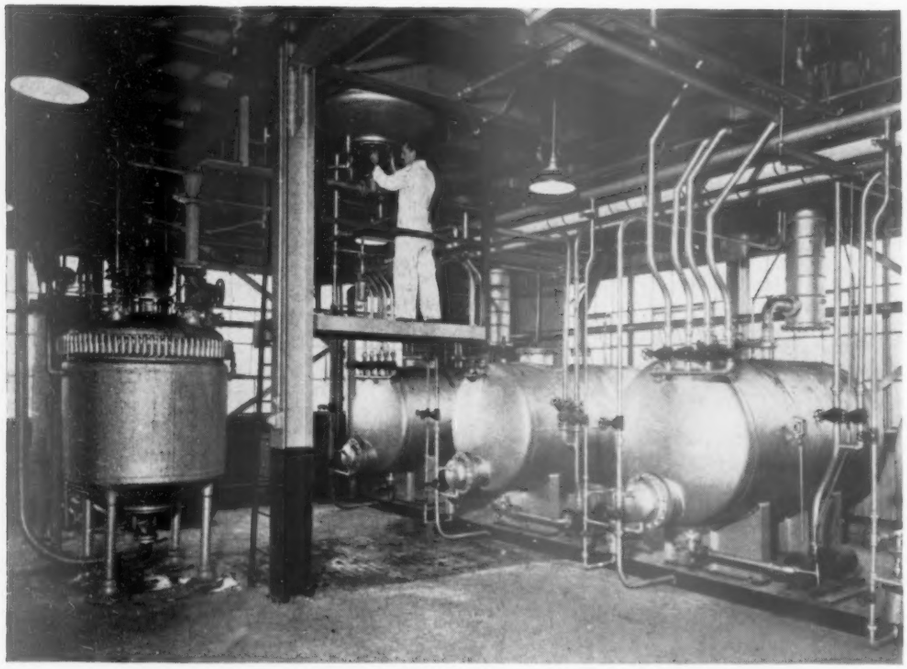


These three compounds can then be separated by fractional distillation.

An alternative method for their manufacture starts with the production of ethylene oxide, CH_2-CH_2 (O), which then can be reacted directly with ammonia to yield a mixture of the same three products.

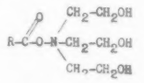
The remaining hydroxy amines listed above, as well as others, are derived from the paraffins, especially propane and butane. Nitration of these hydrocarbons yields nitromethane, nitroethane, and nitropropanes. These compounds are reacted with formaldehyde to yield hydroxy nitro products which can be reduced readily to hydroxy amines. The case of 2-amino-2-methyl-1-propanol is representative:





Plant for the production of nitroparaffin derivatives from components of natural gas. These new industrial chemicals are essential intermediates for a number of surface-active agents. (Courtesy of Commercial Solvents Corp.)

A typical soap produced from triethanolamine is obtained by saponifying a fat or oil with the amine instead of with caustic. This soap possesses the structure:



These soaps exhibit detergent characteristics in either water or organic solvents such as gasoline, a fact that adapts them to use in dry cleaning. They are especially valuable in the preparation of soluble oils (mineral oils which contain some 10% of these soaps) which emulsify readily in water. Such soluble oils are used as textile lubricants and as wool and rayon oils which soften the fibers, assist dyeing, and facilitate mechanical manipulation. These oils also find extensive use as cutting oils in machining operations and as components of insecticidal sprays. Leather dressings, polishes, cosmetics, sizing, and waterproofing emulsions are other applications.

Petroleum raw materials are important as the source of R in anionic surface-active agents.

The similarity in structure between fatty acids and the higher paraffins present in petroleum has led to a considerable amount of research in an attempt to produce petroleum-derived fatty acids for soap applications. In spite of the large volume of technical literature which has been accumulated on this subject, few commercial processes have resulted. In Germany and Russia, however, industrial oxidation of petroleum hydrocarbons has been conducted on a limited scale, the products being used for both soaps and edible fats. Difficulties encountered in attempting to eliminate disagreeable tastes and odors have been especially hard to surmount.

In this country, controlled oxidation of Pennsylvania petroleum fractions has led to the production of mixtures of acids and esters containing from 5 to 35 carbon atoms in their structure. A number of such mixtures, also comprising higher alcohols, lactones, ketones, and ketonic alcohols, are marketed under the trade name "Alox". They are recommended for numerous applications, including additives to lubricants of various kinds, bactericidal components and shampoos and antiseptic creams, constituents of paint primers and water-repellent compounds, ingredients of cutting and penetrating oils, and flotation agents.

Of considerable industrial significance are carboxylic acids which occur naturally in crude petroleum as naphthenic acids. By treating selected cuts with alkalies, these acids are separated and utilized for a number of important purposes. Their sodium salts have been used for many years as detergents, especially in Russia. Both in this country and abroad, copper naphthenates are employed as wood preservatives, while cobalt, manganese, and lead naphthenates in recent years have assumed considerable importance as driers for paints and varnishes.

Of great importance among the new detergents are those which contain sulfonic acid or sulfate groups. Most of these products can be employed in hard water or in acidic solutions, because, unlike the fatty acids, neither the free

For every refinery service in Synthetic Rubber and High Octane Gas production—there's a J-M INSULATION

FOR ALL-ROUND SERVICE at temperatures between 600° and 1900° F., J-M Superex Combination Insulation. Inner layer of J-M Superex, outer layer of J-M 85% Magnesia or Asbesto-Sponge Felted provide high heat resistance and efficiency. Blocks and pipe covering.

FOR STEAM LINES UP TO 700° F.—J-M Asbesto-Sponge Felted Pipe Insulation provides high salvage value, unusual durability. 3-ft. sections. Thicknesses from 1" to 3". Integral waterproof jacket for outdoor use.

FOR REFRIGERATED SERVICE—J-M Rock Cork. Basically mineral. Can't rot, won't support vermin or mold. In sheets, 18" x 36", 1" to 4" thicknesses. Pipe covering in 3-ft. sections with integral waterproof jacket.

FOR BOILER DRUMS, WATER WALLS, TANKS, BREECHINGS—J-M 85% Magnesia Blocks, highly efficient at temperatures up to 600° F. Sizes 3" x 18", 6" x 36", 12" x 36", flat or curved. Thicknesses 1" to 4".

FOR FURNACE INSULATION UP TO 1900° F.—J-M Superex Blocks, for years the most widely used block insulation at these temperatures. Sizes, 3" x 18", 6" x 36", 12" x 36". Thicknesses, 1" to 4", flat or curved.

FOR FURNACE INSULATION UP TO 2600° F.—3 types of J-M Insulating Brick, 4 types of J-M Insulating Fire Brick, are available. Furnished in all standard 9" shapes of the 2½" and 3" series, as well as in specials.

Other Johns-Manville Products for the Petroleum Industry

Asbestos Pipe Line Felts
Packings
Flat and Corrugated Transite for Walls and Roofs
Electrical Materials
Industrial Friction Materials
Transite Pressure Pipe
Built-Up Roofing
Refractory Products

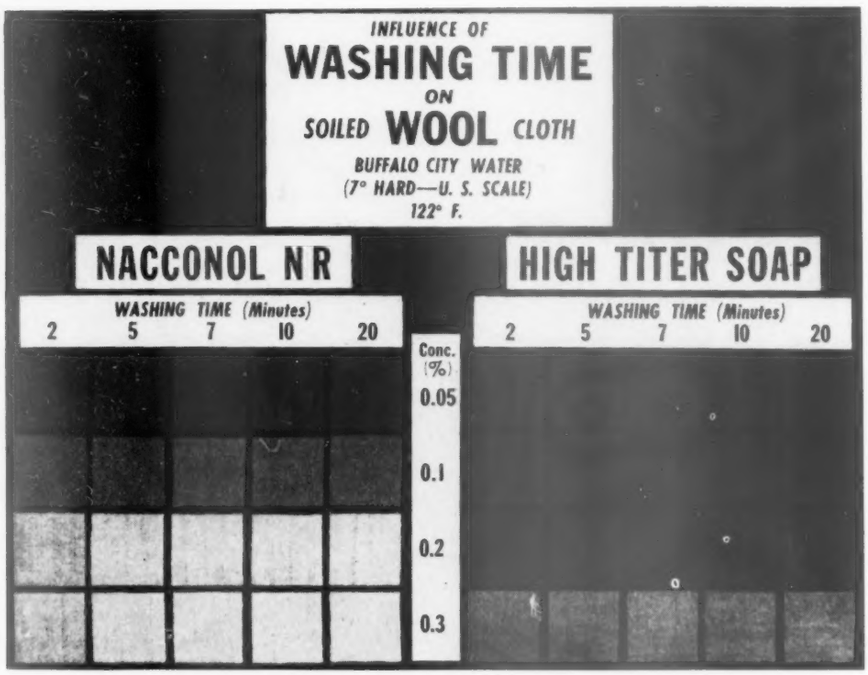
For details on these materials, and on the complete J-M Insulation line, write for catalog GI-6A. Johns-Manville, 22 East 40th Street, New York, N. Y.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

INDUSTRIAL INSULATIONS

for every temperature . . . for every service



Comparative washing tests upon soiled wool using a typical city water show the marked superiority of alkyl aryl sulfonates derived from petroleum. (Courtesy of National Aniline Division. Allied Chemical and Dye Corp.)

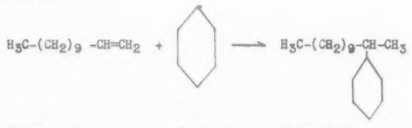
sulfonic acids nor their calcium or magnesium salts are insoluble in water.

Very complex mixtures of sulfonic acids constitute both mahogany acids and green acids, obtained as by-products during sulfuric acid refining of petroleum. These sulfonated products, in various stages of refinement, have long been used as cheap detergents, fat-splitting agents, and emulsifying agents in cutting oils and insecticidal dispersions. More recently they have been employed for breaking refractory petroleum emulsions. Certain sulfonated petroleum and shale-oil products have specialized uses because of their therapeutic value. Ichthyol is an important example, being of utility as a weak antiseptic, as an emollient, and as an agent for the treatment of certain skin diseases.

Sodium salts of various sulfonated petroleum hydrocarbons, such as "Dipex" and "Stablex G", are used as wetting agents in the textile industry, as lubricants for rubber molds, and as emulsifiers for rubber latex.

A considerable number of highly effective surface-active agents are now manufactured by sulfonation of various hydrocarbons or mixtures prepared synthetically. These products are often relatively complex mixtures of several similar chemical compounds, but their nature is much more clearly defined than is that of the sulfonated by-products of petroleum refining.

Among the most important materials of this category are those produced by reacting an aromatic hydrocarbon with an olefin, alcohol, alkyl halide, or analogous compound to produce an aromatic compound having an aliphatic side chain. For simplicity's sake, the reaction can be illustrated with benzene and dodecene-1:

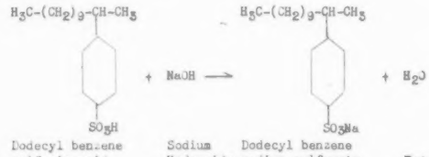


Dodecene-1 Benzene Dodecyl benzene

The product then is sulfonated with sulfuric acid or chlorosulfonic acid as follows:

Dodecyl benzene Sulfuric acid Dodecyl benzene sulfonic acid

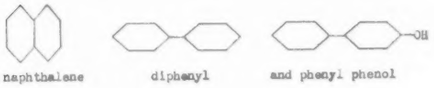
The sulfonic acid thus obtained is neutralized with caustic:



Dodecyl benzene sulfonic acid Sodium Hydroxide Dodecyl benzene sodium sulfonate Water

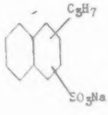
In actual practice, instead of dodecene-1, mixtures of olefins obtained by cracking higher petroleum hydrocarbons are used. Similarly, mixtures of higher alkyl halides derived from chlorination of petroleum hydrocarbons of kerosene cuts are employed to yield comparable substances. In either case, the products are complex mixtures of alkyl benzene sodium sulfonates. Instead of introducing a single long alkyl group into the benzene ring, several shorter ones may be utilized. For example, tributyl benzene may be produced instead of dodecyl benzene. Where the total number of carbon atoms in the side chains is in the order of ten or twelve, either as a single chain or as several short ones, the resulting sulfonated products show very superior detergent characteristics. The first and still most outstanding commercial products of this general type are known under the trade name "Nacconol" and are used widely as detergents in the laundry, dry cleaning, textile, leather, and paper industries, and in such special applications as fruit washing and also nickel plating to prevent pitting. Various other trade-marked materials of this category have appeared more recently. Similar products, sometimes with shorter alkyl groups, possess good wetting properties and are used as foaming agents, emulsifiers, and dyeing assistants.

Not only benzene, but also naphthalene, diphenyl, and phenyl phenol, are alkylated and subsequently sulfonated to produce numerous wetting agents, emulsifying agents, penetrants and dyeing assistants:

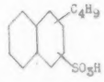


naphthalene diphenyl and phenyl phenol

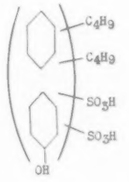
In these instances, alkylation usually is carried out with one of the butyl alcohols or with isopropyl alcohol (or their chemical equivalents). These alcohols, in turn, are derived from petroleum as shown in the previous paper of this series.[3] "Warcosol", for example, is isopropyl naphthalene sodium sulfonate,



"Nekal BX" is a butyl naphthalene sulfonic acid.



"Naccosol A", "Leonil SA", "Aerosol OS", "Merpentine", "Neomerpin N", several "Alkanols", and other trade-marked products are of this general type. On the other hand, "Aresklene" is a sodium disulfonate of dibutyl phenyl phenol,



while "Areskap" and "Aresket" are analogous products. The specific positions of the substituted groups in all these products are indefinite.

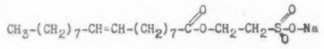
Very effective wetting agents, still more complicated, can be produced by condensing isopropyl naphthalene sulfonic acid with formaldehyde; it has already been shown in previous papers that formaldehyde, too, is now produced, in part, from natural gas. Similar complex products, in which phenol, creosols, or other aromatic compounds are sometimes used

[3] National Petroleum News, Technical Edition, 35, R-107 (1943).

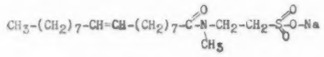
in place of naphthalene, have made their appearance as synthetic tanning agents.

Other types of sulfonated surface-active agents are derived in part from petroleum and in part from fatty acids. A complex sulfonated derivative of butyl ricinoleate is an excellent wetting agent. Ricinoleic acid is the fatty acid constituent of castor oil. Butyl alcohol, with which it is esterified in this wetting agent, is now produced in large quantities from petroleum.

A very considerable number of other sulfonated products possessing still more complicated chemical formulas are made from fatty acids and various chemicals stemming from ethylene. Formulas for two commercial derivatives of oleic acid will serve to indicate their complexity and variety:



"Arctic Syntex A"

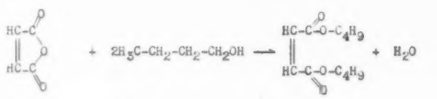


"Igepon T"

In both these compounds, chemically bound ethylene, $CH_2=CH_2$, is recognizable in the right-hand portions of the above formulas. In practice, ethylene is obtained from cracked petroleum gases.

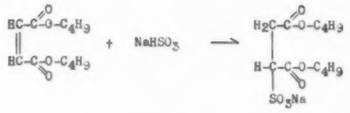
Anionic surface-active agents which are characterized by the presence of a sulfonic acid group are not limited to the types just discussed. Other wetting agents, emulsifiers, and detergents, sold under the trade names "Aerosol AY, IB, MA, and OT", are derived from maleic anhydride. They are soluble in both water and organic solvents, do not precipitate in hard water, and are moderately stable in either acid solutions or mild alkalies. Although the maleic anhydride used for the manufacture of these products is obtained by oxidation of benzene, it has been noted in a preceding article that petroleum will soon serve as a source of benzene, while certain other petroleum hydrocarbons recently have also been found serviceable as sources of maleic anhydride.

The first step in the synthesis of these wetting agents is the conversion of maleic anhydride to maleic esters by reaction with any one of several alcohols evolved from petroleum gases and containing from 4 to 8 carbon atoms. The way in which these alcohols are made from petroleum has been discussed elsewhere.[3] Butyl, amyl, hexyl, and octyl alcohols, all from petroleum sources, are utilized industrially. The reaction with butyl alcohol is representative:



Maleic anhydride — n-Butyl alcohol — Di-n-butyl maleate — Water

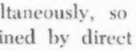
The ester thus formed is converted to "Aerosol IB" by a unique reaction involving simple addition of sodium bisulfite across the double bond:



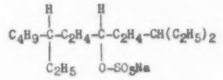
Di-n-butyl maleate — Sodium bisulfite — "Aerosol IB"

It has already been pointed out that in the general formula for anionic detergents R-X-Y, X may be not only and , but also , called the sulfate radical. Where sulfonation is carried out, it is probable that sulfation also occurs simultaneously, so that some of the products obtained by direct sulfonation of petroleum hydrocarbons and by sulfonation of fatty acid derivatives containing double bonds and hydroxyl groups possess both sulfur-bearing hydrophyllic groups, and . Several surface-active agents, however, contain the latter radical exclusively.

Indeed, the "Gardinols", which were among the earliest representatives of the newer detergents that appeared during the last decade and which are still very important, are of this type. Analogous compositions now are also marketed in this country under numerous other trade names, such as "Aurinol", "Avitex AD", the variously lettered "Duponols", "Maprofix", "Mapromal", and "Orvus WA". They are widely employed as wetting agents and detergents, especially in the laundry, textile, and leather trades. They have numerous other applications, such as metal cleaning, latex stabilization, and insecticide and cosmetic formulation. "Dreft" is a comparable product packaged for household use.

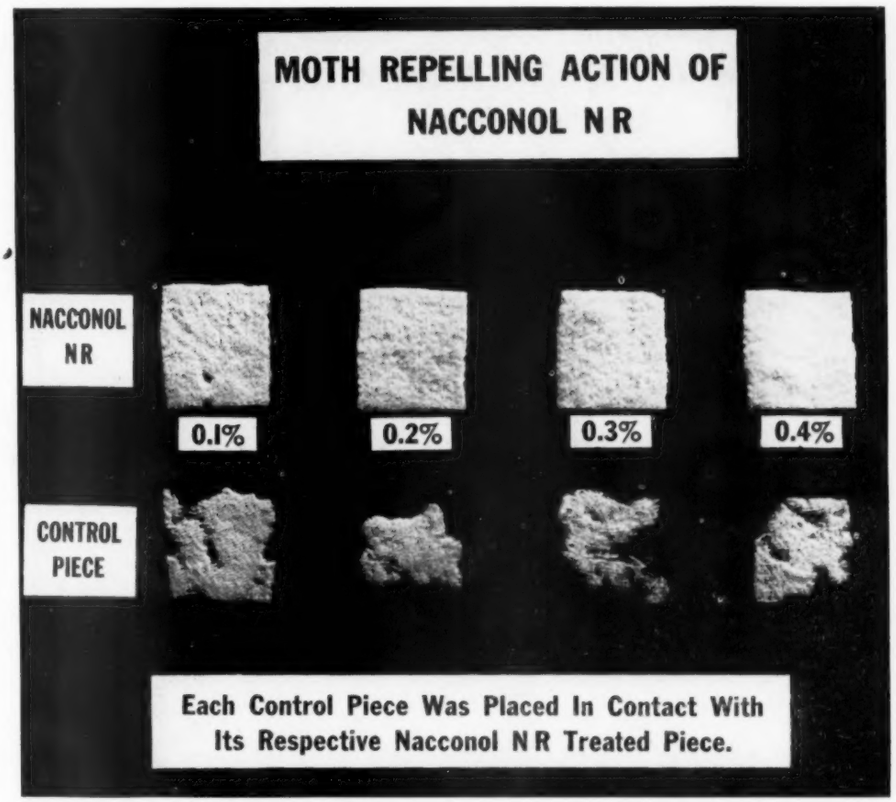
These surface-active agents are manufactured from fatty acids by high-pressure reduction to the corresponding alcohol or from higher alcohols which occur in spermaceti and whale oil. They are sodium sulfates of the alcohols thus obtained. "Orvus WA", obtained from coconut oil, is typical and possesses the chemical formula 

Although these compounds are not derived from petroleum sources, several members of another newer group of wetting and dispersing agents known as the "Tergitols" are somewhat similar. They are produced by sulfation of complex alcohols obtained by devious paths from cracked petroleum gases. "Tergitol Penetrant 7" is typical. Its formula is



The "Tergitols" are used in the textile industry for such operations as kier-boiling, bleaching, dyeing, wool carbonizing, and scouring. They are utilized in leather finishing and dyeing, and in such miscellaneous applications as insecticide formulation, nickel plating operations (for reduction of pitting),

(*Continued on page R-170*)



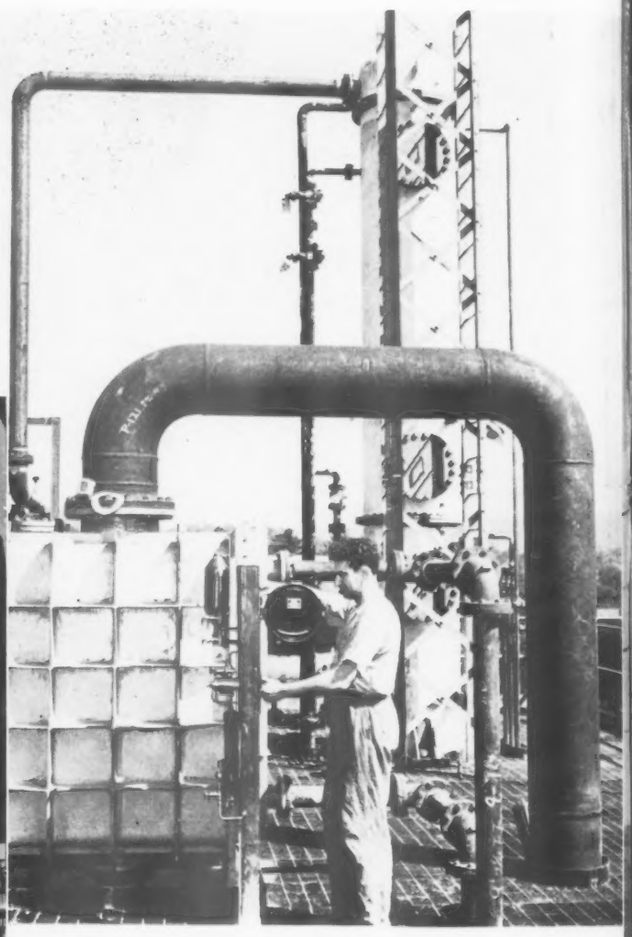
Alkyl aryl sulfonates derived from petroleum are not only excellent detergents, but also exhibit efficient moth repelling characteristics. (Courtesy of National Aniline Division, Allied Chemical and Dye Corp.)

Two War Rubber Plants

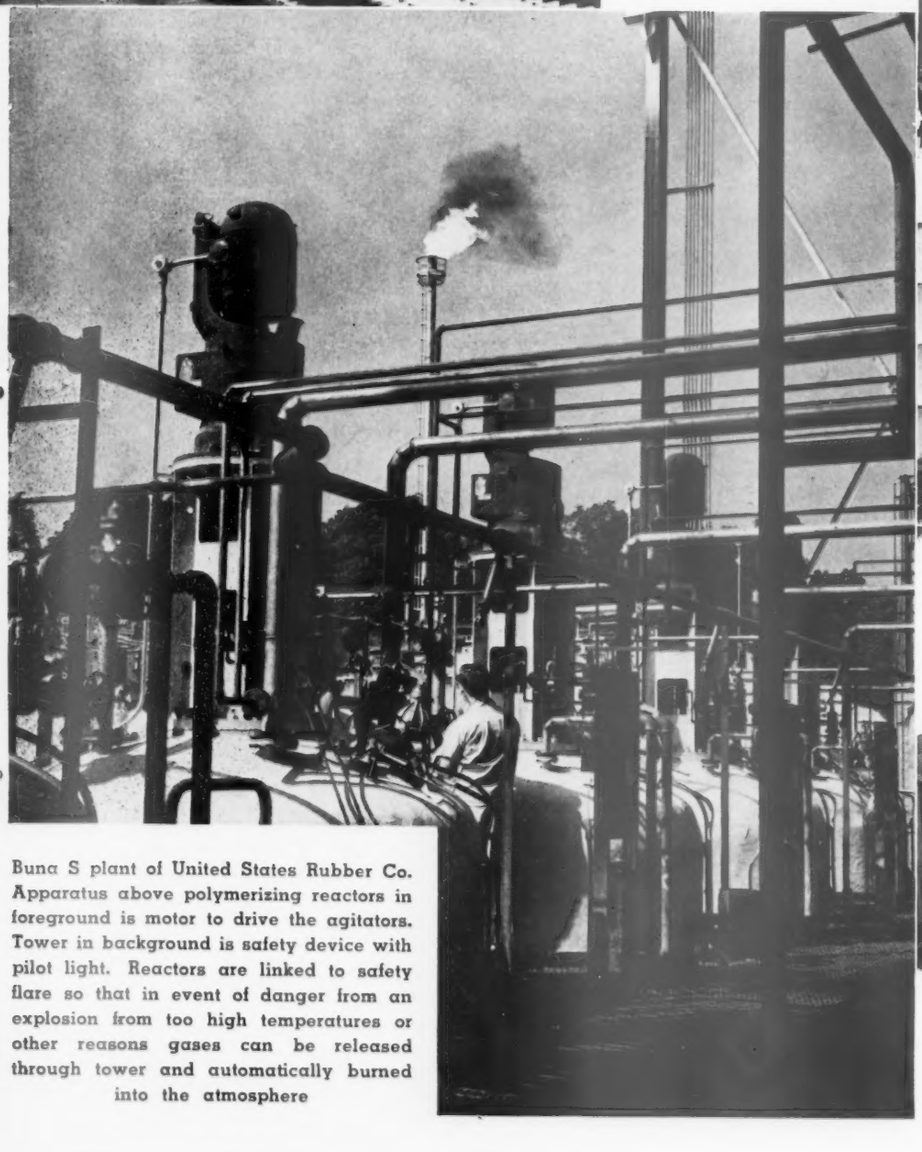
They make Buna S synthetic rubber from butadiene supplied by oil companies, and styrene; using pressure piping, reactors, pumps, compressors and tanks, similar to petroleum refiners' latest type processing units.

These two plants are early completions in the government's synthetic rubber program, which calls for production of 845,000 long tons per year of Buna S rubber, of which plants with capacity of 705,000 tons are now building. Plants are also under construction to make enough butadiene to produce 761,900 tons of Buna S and enough styrene to produce 798,000 tons of Buna S.

Operator - checking control apparatus for autoclave in Firestone plant. This and other processes are mainly automatic. It takes less than 1% of the people required to produce natural rubber to operate a synthetic rubber plant



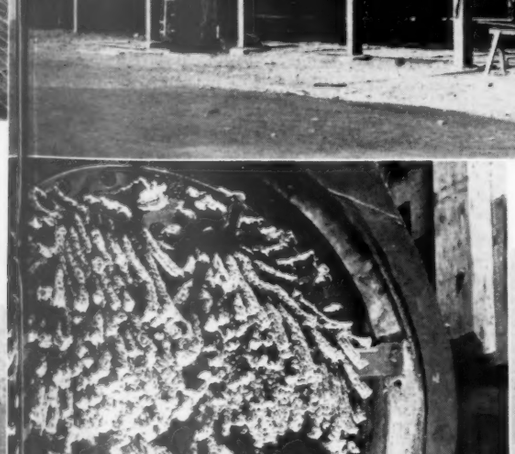
Rectangular apparatus at left condenses the vapors of recovered raw materials. In rear is a column still for purification of butadiene through distillation. Plant is that of the United States Rubber Co.



Buna S plant of United States Rubber Co. Apparatus above polymerizing reactors in foreground is motor to drive the agitators. Tower in background is safety device with pilot light. Reactors are linked to safety flare so that in event of danger from an explosion from too high temperatures or other reasons gases can be released through tower and automatically burned into the atmosphere

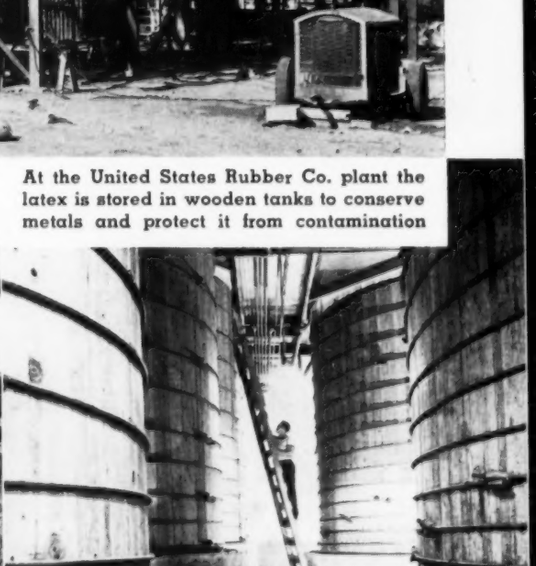
At the Firestons plant the latex coming from processing units in form of pellets is baled in 75-pound blocks. Baling process increases density of the rubber from about 20 to 55 lbs. per cu. ft.

First plant in the government's synthetic rubber program to get into operation was this unit of Firestone Tire & Rubber Co. It is capable of producing as much rubber as could be supplied from 100,000 acres of rubber trees. At left are the autoclaves in which the butadiene and styrene are polymerized into latex. At right are towers for redistilling and purifying the butadiene and styrene and other steps in the processing

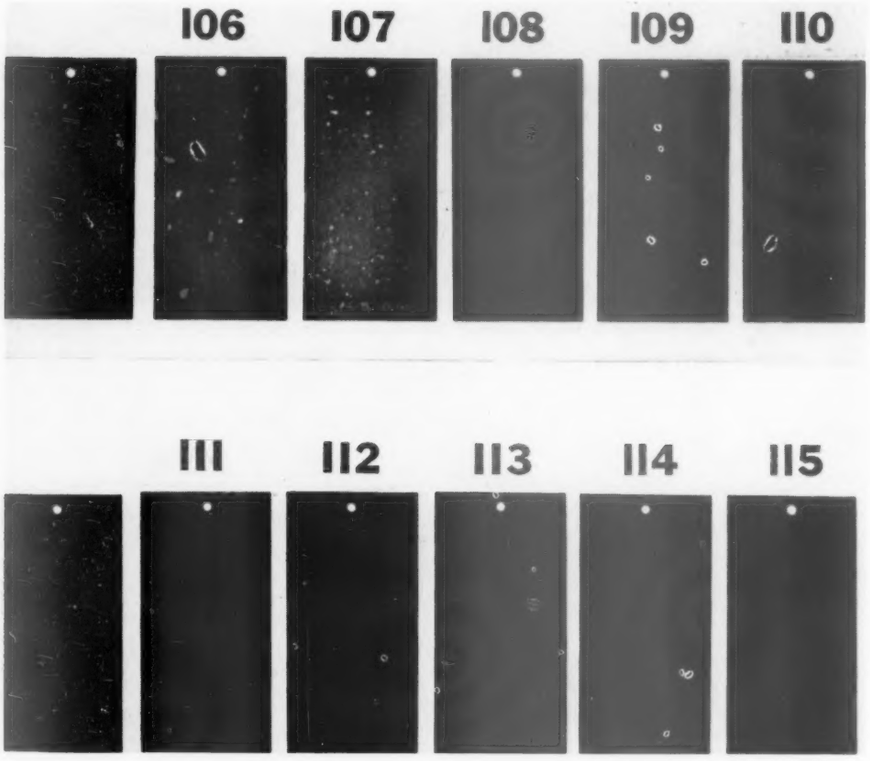


After washing, in the United States Rubber plant, the lank for Buna S rubber is forced over a screen and through holes to break up the larger pieces and remove water before it goes to the tunnel drier

Latex coming from the reactors in the Firestone plant goes through a disintegrator or pelletizer where the coagulum is squeezed into small pieces to facilitate drying the rubber



At the United States Rubber Co. plant the latex is stored in wooden tanks to conserve metals and protect it from contamination



The effectiveness of alkaline cleaners in the metal industry can be substantially enhanced by addition of 5 to 10% of alkyl aryl sulfonates. This illustration shows a group of steel strips photographed under ultraviolet light. Presence of an oil film is indicated by fluorescence, appearing in the photographs as light areas. At the left, both top and bottom, are blank strips of unoiled steel. To their right follow oiled strips washed, without scrubbing, for 2, 4, 6, 8 and 10 minutes respectively. The cleaning solution used for the top row consisted of a 5% solution of sodium metasilicate. The strips in the bottom row were cleaned with a 5% solution of a mixture of 95 parts of sodium metasilicate and 5 parts of "Nacconol NR". (Courtesy of National Aniline Division, Allied Chemical and Dye Corp.)

wet processing of clay and cement, bottle washing, and the removal of dust by means of water sprays in recycling equipment of air-conditioning installations.

Cationic Surface-Active Agents

The general formula previously given for surface-active agents is R-X-Y. Where anionic substances of this type are dissolved in water, the resulting ions are $_{RX}$ and $_{Y}$. As explained above, it is the complexity of $_{RX}$ which confers surface-active properties on these materials. It is possible likewise to construct molecular edifices which are salts, but in which the cation, rather than the anion, is the active complex. The same general formula applies, but the electrical charges are reversed, so that, in aqueous solutions, cationic surface-active materials are dissociated into the complex cation $_{RX}$ and the relatively simple anion $_{Y}$.

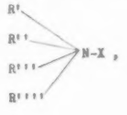
In this case, $_{Y}$ is usually chlorine or the acetate radical derived from acetic acid. The complex cations are of a basic character.

Cationic surface-active agents are of still more recent origin than the anionic products already discussed. The so-called "Sapamines" were early industrial representatives of these materials. These substances reportedly give rise to foam where as little as one part is dissolved in two million parts of water. They are effective in the presence of lime as well as in acid and neutral solutions, although they are precipitated by alkali. Modifications which are active in alkaline solutions also can be produced. The "Sapamines" are salts of the following compound, produced by reaction of oleic acid with an amine derived from cracked gases:

More recent cationic surface-active agents have been developed. They are salts of compounds possessing still more complicated structures, produced by condensation of various fatty acids with polyamines or hydroxy amines obtained from previously-mentioned petroleum sources. Characteristic of these products are the "Onyxsans", whose active constituents have the general formula

where R is a fatty acid radical and R′ is any one of several groups derived from the olefins of cracked gases. These products are useful in hard water or in acid solutions, although some of them are sensitive to such precipitants as Glauber's salt, sulfates, and various anionic surface-active agents. They have proved especially valuable in the treatment of various textiles, especially cottons and rayons, to soften them and improve hand. In the case of cellulosic goods, the effect is to increase resistance to laundering. These products, therefore, are employed extensively by the textile industry for this purpose. The amount of rayon fabrics treated with cationic finishing agents increased tenfold from 1937 to 1941, so that in the latter year some 65% of the total American production of rayon was so treated.

Another type of cationic surface-active agent possesses the general formula

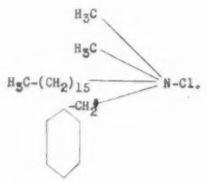


Extra! A New Article Added to the "ABC" Series.
"Aviation Gasoline, and Basic Hydrocarbon Reactions".
In May 5th Technical Section of National Petroleum News.

In view of the rapid developments in the methods for supplying aviation gasoline in the volume needed by our armed forces, and the fact that the technique for making the present components of 100-octane gasoline is similar to that for the separation of products used for chemical intermediates, the authors have deemed it advisable to add to the series, "ABC of Chemical Derivatives from Petroleum", an article devoted largely to aviation gasoline. This article will also include a discussion of basic hydrocarbon reactions, which will serve to round out the material which has been presented in this series exclusive to National Petroleum News. This article will be published in the May 5 NPN Technical Section.

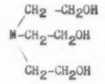
The final article in the series, Article 7, will appear in the June Technical Section. It will add to the practical value of the series to refinery managers and oil company heads, by pointing out the factors to be considered by the individual company in determining its participation in the new chemicals-from-petroleum field. Among subjects to be included will be the evaluation of the crude supply or gas stream for making these new products, adapting and converting existing equipment and methods and the various stages of processing which the oil company may decide to engage in.

where the various R's are alkyl, aryl, or alkaryl groups and X is usually chlorine. One of the R's is ordinarily a higher aliphatic radical. "Triton K-60" is a product of this category which is used as a wetting and dispersing agent in the textile industry. It possesses the structure



A somewhat similar product possessing the general formula $C_6H_5CH_2N(CH_3)_2RCl$, where R represents a mixture of alkyl radicals from C_8H_{17} to $C_{18}H_{37}$, is sold under the trade name "Zephiran Chloride" as a new and unique cationic detergent for pharmaceutical purposes. It is recommended as a surface disinfectant which is germicidal for many pathogenic nonsporulating bacteria and is used as an eye-wash and in the treatment of superficial injuries and infected wounds, as well as in the disinfecting of metallic instruments and rubber articles.

In addition to anionic and cationic surface-active agents, several other types of emulsifying, wetting, dispersing, and penetrating agents are on the market. They come in part from the olefins of cracked gases. Chief among them are the polyalkylene polyamines and polyalkanolamines, represented by triethanolamine,



Also of importance are the polyglycols, such as $HO\text{-}CH_2\text{-}CH_2\text{-}O\text{-}(CH_2\text{-}CH_2\text{-}O)_x\text{-}CH_2\text{-}CH_2\text{-}OH$, and their esters with various fatty acids, represented by products sold under the trade name "Tween".

The impact of these new synthetic surface-active agents upon innumerable industries has been of tremendous importance during the past few years. Their significance is indicated by the thousands of patents which have appeared in this field since 1925 and by the fact that well over 250 different commercial products of this kind are now manufactured in this country. In the production of a large proportion of these materials, chemical intermediates derived from petroleum bases are indispensable.

Lubricants

Chemicals emanating from petroleum are also becoming increasingly important as additions to lubricants to improve various properties. Purely synthetic lubricants are possible, and, in a few cases, actually have been used; but the overwhelming trend has been toward the modification of standard lubricants with chemicals which remedy deficiencies, inhibit undesirable reactions, or otherwise improve performance characteristics. A number of the surface-active agents already discussed are useful additions to lubricating oils and are employed, for example, as oiliness agents or E. P. (extreme pressure) additives. A typical hypoid lubricant consists of a mineral oil containing lead soaps and reactive compounds of chlorine and sulfur; the latter chemicals are believed to bind the lubricant to the surface by actual chemical reaction. Sulfurized fatty oils are typical mild E.P. agents. Metallic naphthenates find some application as sludge dispersers and detergents in lubricating oils.

Generally Contain Metallic Soaps

Lubricating greases themselves generally comprise suspensions of various amounts of metallic soaps in petroleum oils, the soaps most commonly employed being those of calcium, sodium, aluminum, and lead, while the constituent fatty acids are those of cottonseed oil, tallow, or other animal or vegetable oils and fats.[4] Calcium soaps find use at comparatively low temperatures, while potassium soaps yield greases of satisfactory consistency at higher temperatures. Aluminum soaps, utilized for the lubrication of automobile bodies, retain consistency and stability at high temperatures and are transparent; lead soaps find employment in extreme-pressure greases.

Of particular merit are the oxidation products of Pennsylvania petroleum fractions known as "Alox Compounds". These materials are recommended for use in steam cylinder oils, Diesel and airplane engine oils, extreme-pressure lubricants, non-corrosive greases and cutting oils, leather dressings, and wire-drawing soaps.

The pour-point of lubricating oils can be depressed by addition of other chemicals derived from petroleum. Best known of such products is "Paraflow", a complex mixture obtained by chlorinating paraffin wax followed by condensation with naphthalene in the presence of aluminum chloride. Still more complicated pour-point depressants, known as "Santopours", are produced by condensing chlorinated paraffin wax with phenols or naphthols and esterifying the product with phthalic acid or an analogue.

Other substances obtained by polymerization of olefins from cracked gases serve to flatten the viscosity curves of lubricating oils. The most successful of these materials is "Vistanex", a high polymer of isobutylene.

In these products and in other synthetics, the chemicals-from-petroleum industry is improving through research the bulk products of the petroleum industry itself! To paraphrase John Wesley, "Researchfulness is indeed next to genius."

[4]Metallic soaps of petroleum-derived fatty acids have not yet been applied commercially on any scale.

CONSERVING MANPOWER
...by using Brooks
LOAD LUGGER
The Sludge QUESTION
Brooks has the ANSWER
Write for this Bulletin
This shows the new, easy method of handling sludge with a truck-mounted LOAD LUGGER and detachable dump buckets.
It solves today's manpower problems . . . one driver travels back and forth from tank to dump, handling the bucket loads continuously. No waiting, no idle trucks, no time wasted. You can convert your present truck, as the LOAD LUGGER fits on any standard chassis.
This Brooks System is used at leading refineries, marine terminals and tank car or storage yards with big savings.
2004 Davenport Road, Knoxville, Tenn.
Distributors in all Principal Cities
Brooks EQUIPMENT AND MFG. CO.

Re-Refining of Aircraft Engine Oils*

By Gilbert K. Brower**

The proposal is made that considerable savings could be effected in the volume of aircraft engine oils consumed by our armed forces and in the shipping space required to transport these lubricants, if the used oil were properly reclaimed through re-refining at principal aircraft operating bases. In support of the claims as to the suitability of used oils when properly reclaimed, data is given on tests conducted by one of the principal commercial air lines over a period of years on oils reclaimed by various processes. The method of re-refining now extensively used by this concern is also described.

ACCORDING to Larson[1] the demands for aircraft lubricating oils will be 7000 bbls. per day by January, 1943, and by the end of 1943 this requirement will be raised to 13,000 bbls. per day. Is there any logical reason why a considerable share of this high grade oil should not be re-refined? The answer is NO. If only 10% of the average amount of the above two oil requirement figures were re-refined, there would be an annual saving of 15,000,000 gal. of aircraft engine oil. Imagine, if you can, adding to this the heavy duty motor oils used by branches of the service other than aircraft.

There are several thoughts which should be kept in mind during this discussion: First, the subject is re-refining, not just simple reclaiming of aircraft engine oils; second, there is no implied intention that a re-refining process should be attempted on a battle field;[2] and lastly, such a job can and should be done at training bases, maintenance bases, and primary operational points by all military services and commercial operators as well as at the plants of aircraft and aircraft engine manufacturers, whether they be foreign or domestic.

The information contained in this paper is based on 12 years' experience by one of the major air transport operators in the re-refining of its aircraft engine lubricating oils. This program was initiated in the latter part of 1930 with the installation of several types of units at Dallas, Newark, Cincinnati, St. Louis, and Chicago. At the present time, all such operations are carried on in one unit installed at New York, since 90% of all oil changes are made there at approximately 100-hour oil change periods.

In this paper we shall attempt to present, in as concise form as possible, our experience with several types of oil re-refining units and processes, test data on re-refined aircraft engine oils, our experience with such oils in actual air transport operations, personnel requirements, as well as personal comments relative to the study of oil conservation.

Re-refining Versus Reclamation

Though the expression reclaimed oil or reclamation process is commonly used for any oil which has been treated to render it fit for further service (particularly so by the Air Force and oil industry), we feel, very definitely, that a distinction should be made between a reclaimed oil and a re-refined oil. Frankly, we would not use a reclaimed oil in the same manner as one which had been refined. It is only too true that much of the adverse criticism directed towards re-refined oils has been based on experience earned by using oils which have been only reclaimed in the same manner as new oil. We wish, therefore, to point out the distinction we make between these two designations:

By the term, "reclamation", we refer to a process which only removes contaminants such as water and solid substances (insoluble in petroleum naphtha), but not dilution or other products of decomposition. This method is recommended for oils not subject to decomposition or for treating used oils to prolong their useful service life. Such methods as centrifuging, mechanical filtration, etc., would come under this heading.

When reference is made to "*re-refining*", we mean a process which will bring used oils back to a condition substantially equal to new oil characteristics in all respects. Such a method should preferably provide for clay contact, vacuum distillation, steam stripping, etc.

Discussion of Re-Refining Units From An Operating Standpoint

In this section we shall deal only with the operating characteristics of those units or processes with which we have had personal experience, either from an operating standpoint or from test data obtained in our investigations of same; code letters will be used for identification of units discussed. No reference is made to other units which we have investigated but concerning which we have no actual test data. For any given unit or process discussed, the information presented must be considered relative to the dates of our use or investigation.

Unit A

This process consisted of allowing the used oil to settle in drums, then feeding it by gravity to the unit where it went through a vacuum distillation process and was finally permitted to flow by gravity through a specially treated filtering medium, arranged in pans or trays in vertical columns which permitted them to be rotated as they became dirty.

As regards operation of these units, we might point out that they were entirely satisfactory—very little mechanical trouble, labor cost lowest of any type investigated and were run at low temperatures due to the vacuum process, with consequently no hazards involved. Oil re-refined by this process, however, would not meet present new oil specifications. For service conditions in 1930-1932 the oil so treated was approved.

Unit B

In this process, we believe a silicate treatment was used to precipitate sludge and neutralize acidic compounds, this was followed by filtration. We never had occasion to personally witness the detailed operation of this unit since it was operated by a subsidiary company. The oil so treated, however, was invariably poor; particularly as regards low flash, presence of water, high carbon content and neutralization values; even though operated under the supervision of a division engineer. Based on those results, we did not feel that such a process was sufficiently fool-proof and hence no further consideration has been given to it.

Unit C

The following process was never directly operated by ourselves but only by a company which later became a part of our system. We did, however, assemble test data on this process by having some of our used oil re-refined by an independent company using such a method, by obtaining samples from the operator previously operating the unit, and testing samples submitted by another transport operator.

The operation of this process consisted essentially of allowing the oil to flow by gravity through a simple coil type heat exchanger, thence into a mixing chamber where clay was added. After agitation, the oil and clay were forced by air pressure into a heating still where the temperature was raised to the proper degree, as determined by an automatic thermostat. Steam, supplied by injection water, was allowed to flow through the oil, thus aiding in the elimination of any dilution not removed by heat alone. The vapors driven off passed through an expansion chamber to a condenser and vented receiver. After the steam stripping, the oil and clay mixture was passed into a filter chamber where air pressure forced

(1) Larson, C. M.—"Aircraft Lubricating Oils for the War Effort", NATIONAL PETROLEUM NEWS, Vol. 34, No. 30, July 29, 1942, p. R-223-R-224.
(2) S.A.E. Journal, October, 1942 (Vol. 50, No. 10) p. 24.

*Presented at the National Fuels and Lubricants Meeting, Society of Automotive Engineers, Tulsa, Oct. 22-23, 1942.

**Materials Engineer, American Airlines, Inc.

Oil men look ahead

WASHINGTON, March 8 .... Study of the postwar readjustments of the petroleum industry will be started at once by a newly appointed group of oil men working under the Petroleum War Council, William R. Boyd, council chairman, announces

Paul Ryan of Cleveland, formerly president of the National Refining Company and widely known oil man, has accepted the full time post as chairman of the working subcommittee and will serve without compensation—TULSA WORLD, March 9, 1943

To win the war is the first big job for all of us —the only job right now—and the oil industry is working at it full time

But it's wise to look ahead The end of the war will be the beginning of a new era for refiners who are ready to seize opportunity U.O.P. processes will offer the opportunities as they have for more than a quarter of a century

Universal refining specialists are busy in every refining center today, converting existing U.O.P. units to produce the components of 100 octane gasoline and synthetic rubber, and designing units to operate new Universal processes

Hundred octane gasoline today is a special superproduct and all of it must go to our fighting flyers till victory is won But its production won't end with the war—the oil industry never has gone backward

The American motoring—and flying—public will demand the best motor fuel there is after the war, as they always have Universal processes and Universal units will be making it

OIL IS AMMUNITION—USE IT WISELY CARE FOR YOUR CAR FOR YOUR COUNTRY

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

THE REFINERS INSTITUTE OF PETROLEUM TECHNOLOGY

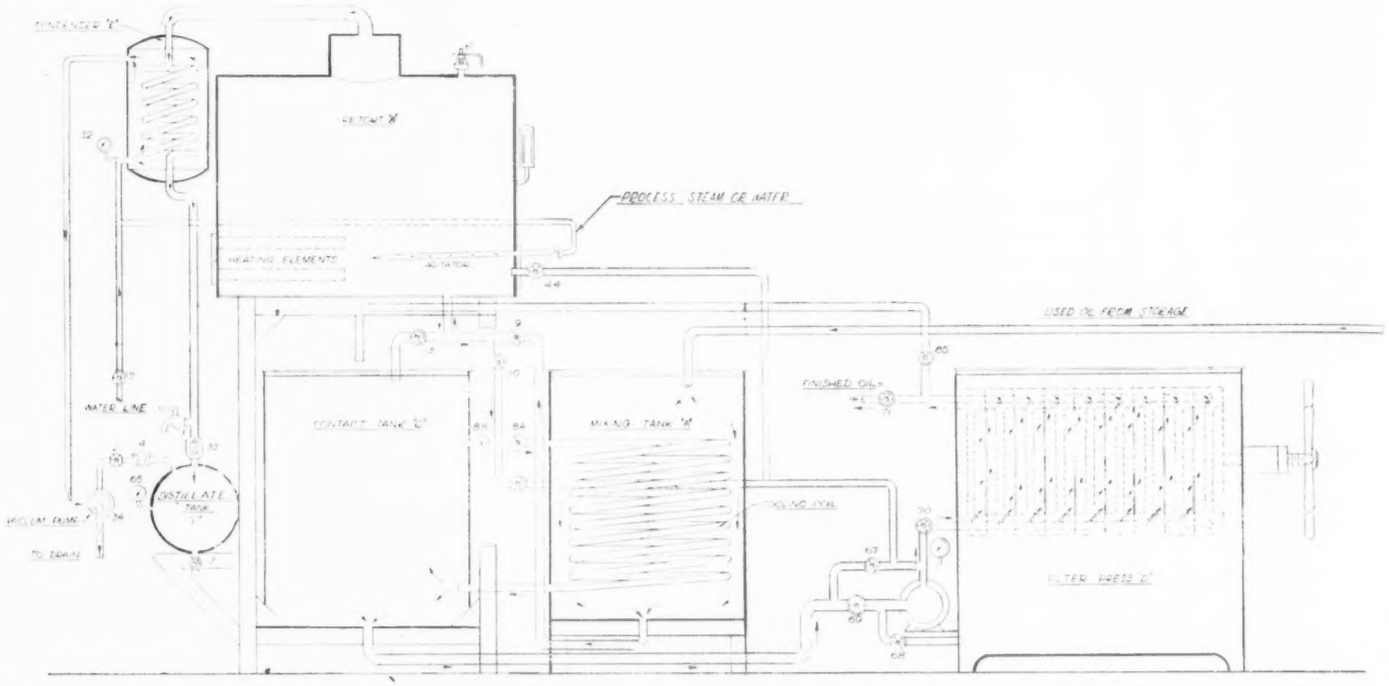


Fig. 1—Flow chart of Refinoil lubricating oil re-refining apparatus developed by American Airlines Inc. Used oil is mixed in tank A with activated earth, drawn by vacuum into electrically-heated retort B. Here under controlled vacuum temperature is raised by steam to strip off dilution, moisture and other impurities. After proper clay contact the oil and earth flow by gravity through coils in the mixing tank which act as a heat exchanger to contact tank C, where a filter aid is added. It is then pumped through filter press D. Vapors are drawn from the still by vacuum through condenser E to a run-down tank F

the clean oil through a paper type filter, thence through a heat exchanger for cooling, and on into the clean oil storage tank.

The disadvantages of this method were:

1. The process was too small a batch system, whereby only 5 gal. of oil and clay at a time were mixed. Thus in a 24-hour operation only 200 gal. could be produced.

2. Extreme care had to be taken to see that all operating conditions remained substantially the same for all batches in order to make certain that the oil was re-refined to constant specification limits.

3. The filter was of a paper type and poorly designed, which meant that unless the pressure was carefully controlled it had a tendency to break. Thus a batch could be completely spoiled and a re-run required.

Unit D

One of the units used with considerable success during the first 6 years was designed and built by American Airlines' shops. It had a capacity of 500 gal. per day. The process involved was as follows:

Approximately 225 gal. of drained oil was pumped into an agitator tank, equipped with closed steam coils, and heated to 275°-300°F., during which time it was slowly and continuously agitated. The temperature was maintained until all dilution and moisture had been expelled. At this point flash and viscosity tests were made. If satisfactory, approximately 1 to 1.5 pounds of Fuller's earth was added per gallon of oil and the treatment continued for another 20 to 30 minutes prior to being filtered. An average loss of 7 to 10% was encountered in this process.

The disadvantages of this unit were:

1. Space required quite large for production capacity.

2. Time factor too long for the time the oil was held at temperature in the open agitator.

3. Digestion with earth occurred at too low a temperature.

4. No satisfactory cooling provisions provided.

5. Filter process was not fool-proof and hence small quantities of earth could, unless carefully supervised, contaminate the oil.

Unit E

This unit had a production capacity of approximately 150 gal. in 18 hours and operated on the following general principle:

The first step in this process was the mixing of the raw stock with an activated earth. The earth and oil mixture was then pumped in the cold state to the cold oil side of two parallel heat exchangers; one a hot vapor and the other a hot oil heat exchanger. The oil then passed to an electrically heated pipe still, where it was raised in a single passage to the predetermined temperature for distillation; i.e., 550°F. for the oil being treated at that time. From the pipe still the oil and vapors discharged at their maximum temperatures into a flash tower or separator. The residual oil flowed by gravity to a filter basin carrying with it the clay content. The vapors were passed to the hot vapor heat exchanger where they traveled counter-current to the incoming old oil; giving up their heat and condensing into liquid form. The residual oil after going to the filter basin was drawn by vacuum through a rotary type filter, which was continually operating, into the hot oil heat exchanger, imparting some of its heat to the incoming cold oil and reducing the temperature of the filtered oil. The re-refined oil then passed through a vacuum pump and was expelled on the exhaust stroke as a finished product.

The disadvantages of this process were:

1. A slight cracking reaction occurred due to high local heat in the pipe still.

2. Some oxidation and possibly polymerization occurred due to filtering at too high a temperature in the presence of air.

3. Better cooling provisions should have been provided.

4. Materials of construction were cheap and in some cases not suitable for the job.

Unit F

This unit was investigated by personally visiting the plant of the manufacturer and having several drums of used oil processed by them for our subsequent study.

In general, the process used consisted of heating the used oil and a filtering earth under automatic control to evaporate dilution, moisture, etc., slowly; the distillation products being scavenged by flowing air over the surface of the hot oil, in the case of aircraft oils at a maximum temperature of 425°F. The oil-earth mixture was then dropped from the heating unit to another chamber and forced by air pressure through a filter.

In general, there were several advantages to this unit making it worthy of consideration, such as good construction and workmanship, relatively low labor cost involved, available in several sizes, etc. Its main fault, as will be pointed out later, was its inability to meet all new oil requirements.

Unit G—Refinoil Unit—American Airlines' Process

The unit we are currently using is known as the Refinoil unit and is operated by ourselves under the following general conditions: Refer to Fig. 1.

The used oil is mixed with an activated earth in a mixing tank (A) and then drawn by vacuum into an electrically heated still or retort (B) where it is raised, under controlled vacuum and steam stripping to a sufficiently high temperature to strip off dilution, moisture, etc., and maintained at such temperatures for a sufficient length of time to insure proper clay contact. After this the heat and vacuum are turned off and the oil and earth allowed to flow by gravity through coils (which act as a heat exchanger) in the mixing tank (A) to the contact tank (C) where a filter aid is added. It is then pumped through a plate and frame-type filter press (D), with the filter cloths preceded and/or backed up by a paper filtering medium. The vapors are drawn from the still by vacuum through a condenser (E) to a run-down or distillate tank (F).

The vacuum used in the process is produced by passing the water, which has acted as the coolant for the condenser, through an inverted type steam jet. Any type of filtering earth may be used in the contact treatment such as fuller's earth, etc. We have recently been using two types of activated earths, since by so doing we have only to handle half the amount of material which would be required if raw earth were used, namely, Magnesol and Retrol, with the latter type now being our standard material. For a filter aid, either J-M Hyflo Super Cel or a similar product manufactured by the Dicalite people may be used. Either water injection through a needle valve or direct steam injection may be used to provide the steam required for the stripping operation. No specific data as to temperature should be listed since this condition is dictated by the grades of oil being re-refined, by the type of earth used, and by the condition of the drainings. We have tried several temperatures and would say that for most aircraft oils temperatures in the order of 475° to 600°F. are satisfactory. Several trial runs at the time the unit is installed will quickly determine the optimum temperature to use by running such control tests as viscosity, flash, fire, emulsion, gravity, etc. At present, in our operations, we go to a maximum of 525°F., steam stripping from 425°F. on up. Too much "puking" would occur if this operation were started at lower temperatures, particularly so if there is much moisture in the oil or earth. The vacuum is generally started at a lower point, approximately 350°F., and gradually built up to a maximum as the temperature is increased using care to prevent any tendency to "puke". No acid treatment is approved.

Table 1—Typical Analyses of Used Aircraft Engine Oils

Sample No.	DD	E	ES1	ES2	ES3	ES4	ES5
Date	5-20-41	5-20-41	—	—	—	—	—
Time Since Overhaul — Hours	624	589	650	101	482	302	530
Time Since Oil Change — Hours	82:06	98:58	60:39	98:20	98:47	100:49	109:54
Viscosity — S.U. @ 210°F.	130	129	130	125	129	132	129
Carbon Residue — Conradson	2.15	2.15	2.12	2.08	2.11	2.43	1.89
Neutralization No.	0.20	0.15	0.10	0.13	0.10	0.10	0.10
Sludge — % (Wright Method)	1.33	1.35	1.41	1.41	1.45	1.92	1.50
Analysis of Sludge:							
Asphaltenes	0.12	0.19	0.21	0.37	0.22	0.32	0.15
Carbon and Carbonaceous	0.61	0.63	0.81	0.62	0.71	1.05	0.77
Inorganic Matter	0.60	0.53	0.39	0.42	0.52	0.55	0.38

Table 2—Typical Analyses of Re-Refined Oils

(By units A through E°)

Unit	A	B	C	D	E
Date	4-32	4-32	7-33	11-32	5-7-37
Compounded	No	No	No	No	Yes
Viscosity — S.U. at 210°F.	123	124	119	120	113
Viscosity — S.U. at 100°F.	1784	1786	1535	1668	1283
Viscosity — Index	—	—	—	—	—
Viscosity Ratio	14.4	14.5	12.9	13.9	11.3
Flash — °F. (COC)	465	480	455	500	425
Pour — °F.	10	10	10	10	15
Neutralization No.	0.11	0.14	0.065	0.075	0.264
Carbon (Conradson)	1.36	1.68	1.35	1.07	0.57
Precipitation	None	0.05	None	Trace	None
Emulsion — Water at 180°F.	°°DNP	DNP	O.K.	O.K.	O.K.

°These units originally operated by American Airlines but not used or approved after the advent of higher powered engines.

°°DNP — Did not pass.

In our investigation of re-refined oils we have had access and reference to a large amount of test data as obtained by Wright Aeronautical Corp., Sinclair Refining Co., and our own Materials Laboratory. Particular emphasis has naturally been placed on our present process and unit (Refinoil). For tests run and the results of tests reference should be made to Tables I through VIII.

Discussion of Test Results

Here we shall present pertinent comments relative to the tests of used oils re-refined by the several units and processes previously referred to, as well as a considerable number of tests on our present process.

Used Oil Analyses

In order to provide a better picture of the products of decomposition and/or contaminants which cause deterioration of oils in service and which must be removed by re-refining, we attach as Table 1 of this report some typical analyses of used aircraft engine oils. Note the total sludge content of approximately 1 to 1.5%, of which approximately 15% is tarry matter, 45% carbon and carbonaceous material, and 40% inorganic matter such as silica, lead compounds, and other metallic material. Generally, the neutralization values are slightly higher and must be corrected; there is seldom any dilution as such unless the Army hopper system is used for cold weather starting or unless the used oil has been drained from the lower output engines. Due to this factor and because most of our oils are drained from the higher powered engines, we permit our re-refined oils to have a viscosity maximum at 210°F. of approximately 5 seconds higher than the original new oil currently being used.

Tests of Re-Refined Oils—Units A Through E

Table 2 lists typical analyses of oils re-refined by Units A through E, as previously discussed. These units were once operated

Table 3—Comparative Tests of New and Re-Refined Oils

(Units F and G by manufacturers' processes)

Unit	New Oil	G	G	F°
Sample No.	G2	B2	C2°°°	—
Date	4-23-37	4-23-37	4-23-37	4-?-38
Compounded	Yes	Yes	Yes	No
Gravity — °API	27.9	27.7	27.9	28.2
Viscosity — S.U. @ 210°F.	115	112	98	122
Viscosity — S.U. @ 100°F.	1340	1256	1029	1545
Viscosity Index	108.5	110.2	109.3	105
Flash — °F. (COC)	500	475	470	510
Fire — °F. (COC)	575	560	545	599
Pour — °F.	15	15	10	20
Neutralization No.	0.236	0.214	0.214	0.028
Carbon (Conradson)	0.57	0.63	0.50	0.61
Precipitation	None	None	None	—
Emulsion at 180°F.	O.K.	O.K.	O.K.	—
Ash	0.002	0.0	0.0	0.0
Iodine No.	21.8	24.0	15.2	34.2°°
Aniline Point — °C.	129	126	121.5	128.0
Saponification	1.76	1.76	2.04	0.29
Color	6 —	7	4½+	6+
Indiana Oxidation:				
IST — Hrs.	320	302	243	310
Visc. Rise/210 @ 50 hrs.	19.5	31.7	12.8	—
Visc. Rise/210 @ 100 hrs.	48.4	59.7	38.2	56.1

°This oil re-refined from improved type new oil drainings with same Iodine values as Column 1 but with higher viscosity, flash, and Indiana Sludge Time.

°°Other confirming tests were 34.3, 36.4, 36.5, 35.7, and 36.0.

°°°Stripped @ 625°F.

by us but are not now considered satisfactory as regards the finished product. The following general comments hold true in each instance.

Unit A—The neutralization number is quite high, poor emulsion characteristics are indicated, relatively high carbon content is noted (at this time our new oil was averaging 1.0 to 1.2% Conradson Carbon), and the oil would not meet the then current Wright Aeronautical sludge and asphaltene test. On the basis of these results we did not seriously consider this unit of further value, particularly since newer engines of higher output were shortly coming into service.

Unit B—High carbon content and neutralization number noted, poor emulsion and some precipitation. Not recommended for use even at that time unless considerably improved.

Unit C—Results were relatively satisfactory as regards the finished product, though as noted in this case, a low flash point was sometimes obtained. This unit was not recommended for further consideration primarily because of unsatisfactory design and low capacity rather than the quality of the final product.

Unit D—The oil re-refined by this unit was very good and equal to new oil specifications then in force, except for a quite frequent tendency to show a trace of precipitation in the final product. This was occasioned by a lack of understanding or care on the part of the operator in his control of the filtering process and partially due to needed improvements in the process. The unit was not considered satisfactory for further use because it was custom built, required too long a period of time for procurement and replacement of parts, and the fact that for future high output engines there was some question as to the ability of this process to meet all contemplated new oil specification requirements.

Unit E—Relatively satisfactory results indicated as regards tests of finished product, except for low flash point. This property could only be overcome by change in equipment design. This unit was not considered sturdy enough or sufficiently standardized to recommend its further use.

Tests of Re-Refined Oils—Units F and G

Table 3 lists laboratory tests of oils re-refined by Units F and G as compared to new oils then being used. These samples were all obtained prior to our purchase of Unit G, and were run per the manufacturers' recommendations. Since then, our new oil has been considerably improved and the method of operating Unit G has also been altered; these will be discussed later. The analyses in Table 3 should not, therefore, be considered except in the light of our present knowledge. This table has only been included to point out two factors which we believe should seriously be considered in the study of oil re-refining, namely, the effect of acid treatment on the final product and the variation possible in Iodine values.

As regards the effect of acid treatment, it is interesting to observe that Sample C-2 (acid treated, using approximately 1 pint of 66° sulphuric acid to 50 gal. of used oil) has a very low Iodine number, low color, and poorer Indiana Sludge Time than the original new oil (sample G-2) or than sample B-2, similarly re-refined but without the acid treatment. In our opinion, this indicates that the used oil so treated has been refined even beyond the point the original new oil was and consequently has had some of its good lubricating value removed. Furthermore, from test data on other re-refined oils not acid treated, it would appear that such a treatment is not necessary.

With respect to the second item, that is Iodine values, we believe this test is an indication as to whether or not the re-refined oil has been properly treated; that is, whether or not all products of oxidation and/or polymerization have been removed or have not

Table 4—Laboratory Tests
Comparison of New Oil vs Re-Refined Oils*

Sample No.	New Oil (9410)	RC2-08°°	RC2-11°°	New Oil (F-392)	R-22
Compounded	Yes	Yes	Yes	No	No
Gravity — °API	28.2	27.9	27.9	28.3	28.2
Flash — °F. (COC)	525	510	530	540	520
Fire — °F. (COC)	595	600	600	610	600
Viscosity — S.U. @ 210°F.	122.0	121.6	121.6	122.5	123.2
Viscosity — S.U. @ 100°F.	1533	1505	1519	1562	1568
Viscosity Index	106	107	106	105	105.2
Pour — °F.	5	15	15	5	15
Carbon (Conradson)	0.624	0.626	0.617	0.57	0.595
Ash	0.000	0.008	0.008	0.000	0.000
Neutralization No.	0.10	0.075	0.10	0.05	0.075
Saponification No.	1.1	0.45	0.34	0.11	0.28
Color	6—	7+(5—)	7—(5—)	4½	6+(4+)
Color Stability (350°F./45min.)	6+(4+)	8—(5—)	8—(5—)	8—(4½+)	8(4½+++)
Iodine Value	22.4	22.8	22.2	22.4	22.7
Aniline Point — °C.	128.5	127.0	126.0	128.5	125.0
Sulphur — %	0.085	0.097	0.095	0.07	—
Navy Emulsion —NaOH	—	Ng76 Ng69	Ng4 OK	—	—
—NaCL	—	Ng Ng	Ng OK	—	—
—Water	—	Ng Ng	OK OK	—	—

*Refinoil unit — American Airlines process.
**Different activated earths used.

Table 5—Indiana Oxidation Tests
Comparison of New Oil vs Re-Refined Oil*

Sample No.	New Oil (9410)	RC2-08°°	RC2-11°°	New Oil (F-392)	R-22
Compounded	Yes	Yes	Yes	No	No
In Glass @ 341°F.:					
IST — Hrs. (10mgs/10gms.)	450	464	397	470	407-408
1.0% Naphtha Insol.-Hrs.	496	497	445	499	433-435
Visc. Rise @ 210°F. @ 50 hrs.	11.7	5.6	11.6	10.5	15.8-15.8
Visc. Rise @ 210°F. @ 100 hrs.	28.0	39.0	33.4	29.1	38.0-39.0
In Iron Tube @ 341°F.:					
IST — Hours	326	358	394		
1.0% Naphtha Insol.-Hrs.	355	386	437		
Visc. Rise @ 210°F. @ 50 hrs.	19.0	27.4	16.4		
Visc. Rise @ 210°F. @ 100 hrs.	48.6	72.0	45.4		
In Glass 450°F.:					
IST — Hours	137 130	104 103	126		
1.0% Naphtha Insol.-Hrs.	158 140	117 115	140		
Visc. Rise @ 210°F. @ 50 hrs.	35.2 47.6	40.2 40.6	42.2		
Visc. Rise @ 210°F. @ 100 hrs.	91.0 137	213 230	170		
In Iron Tube @ 450°F.:					
IST — Hours	110	130 102	103		
1.0% Naphtha Insol.-Hrs.	127	151 113	135		
Visc. Rise @ 210°F. @ 50 hrs.	31	29.6 29.4	36.4		
Visc. Rise @ 210°F. @ 100 hrs.	87.2	126 140	135.6		

*Refinoil unit — American Airlines process.
**Different activated earths used.

Table 6—Underwood Oxidation and Oxygen Absorption Tests
Comparison of New Oil vs Re-Refined Oil*

Underwood Oxidation Tests: Sample No.	New Oil (9410)			RC2-08°°			RC2-11°°		
Compounded	Yes			Yes			Yes		
	Orig. Oil	0.01% Fe_2O_3 Added 5 hr.	10 hr.	Orig. Oil	0.01% Fe_2O_3 Added 5 hr.	10 hr.	Orig. Oil	0.01% Fe_2O_3 Added 5 hr.	10 hr.
Ca-Ag Loss in Mgs.		804	1528		495	994		464	736
Viscosity—S. U. @210°F.	123	280	542	119	290	891	122	259	612
Carbon (Conradson)	0.69	2.96	4.24	0.68	3.19	5.41	0.68	2.99	4.65
Neutralization No. (Method A)	0.10			0.13			0.10		
Neutralization No. (Method B)		5.65	7.9		2.25	9.10		5.10	11.10
% Naphtha Insol.		0.02	0.03		0.02	0.04		0.02	0.05
% Chloroform Insol.		0.01	0.01		0.01	0.01		0.01	0.02

* Refinoil unit—American Airlines process.
** Different activated earths used.

Oxygen Absorption Tests (pure O_2 @ 400°F.): Sample No.	New Oil (9410)	RC2-08°°	RC2-11°°	New Oil (F-392)	R-22
Compounded	Yes	Yes	Yes	No	No
Minutes for 1st 3000cc. O_2	87	47	69	29.9	27.0

**Different activated earths used.

been formed during the re-refining process; also, as to whether or not such an oil has been overtreated or undertreated in certain respects.

In order to clarify the above, let us refer again to the various analyses in Table 3. First, it must be realized that oils from different crudes and/or oils refined by differing processes vary considerably in their Iodine values. We know of three oils currently approved for service having approximately the following values: 7-5, 17-18, and 22-26. We believe that, if either of these oils had been re-refined in a different manner, it is quite likely that they would not have met the approval tests required. By the same token, when such oils are re-refined, we believe the finished products should have substantially the same Iodine values as the original oil. If they do not, and they show higher values, then we should suspect the presence of some products which were not present originally in the new oil and which were formed during either the re-refining process or during service operation and not removed during the re-refining process. If lower than the original oil, we should suspect an over treatment had been given and question the stability of such an oil.

Tests of Re-Refined Oils—Refinoil Unit—Current AA Process

The test results discussed in this section are valid for our present re-refining operations and new oils. Stress is placed here not only on the commonly specified tests but also on several tests indicative of the stability characteristics of the oils tested.

Routine Laboratory Tests (Refinoil Unit—AA Process)

First to be considered are the normal routine tests. Referring to Table 4 the most pertinent point to be noted and remembered is that in all instances the re-refined oils are equal to the new oils; even with respect to Iodine values and Aniline points. The only possible question might be the emulsion results of sample RC2-08. In this connection, we might say that these test results are most unusual, as in over 259 other similar tests only two have failed to pass the emulsion test with water at 180°F. One instance was traced directly to external contamination and we feel the same holds true in this instance.

Table 7—Sinclair's Bus Engine Sludging Test Comparison of New Oil vs Re-Refined Oil*

Sample No.	New Oil (9410)	RC2-08**	RC2-11**	New Oil (F-392)	R-22
Compounded	Yes	Yes	Yes	No	No
Lead Bath Roof Deposit (at 150 hours)	20.7	18.6	8.3	21.7	22.9
General Condition of Roof	Coked	Coked	Coked	80% Coke	85% Coke
General Condition of Sump	Clean	Clean	Clean	Clean	15% Lacquer Clear
Used Oil Analyses @ 150 hours:					
% Tar	0.488	0.408	0.544	3.792	1.32
% Asphaltenes	0.296	0.248	0.344	1.336	0.44
% Chloroform Insol.	0.192	0.160	0.200	2.456	0.88
% Ash	0.000	0.028	0.000	0.000	0.000
Viscosity—S. U. @ 210°F.	1052	1302	778	1897	2032
Carbon (Conradson)	5.031	5.370	4.383	5.045	5.22
Ash	0.135	0.026	0.081	0.213	0.38
Neut. No. (Method A)	5.8	12.2	10.0	19.1	3.6
Visc. Rise @ 210°F/150 hrs.	930	1180	656	1773	2009
Carbon Rise @ 210°F/150 hrs.	4.407	4.734	3.766	5.41	4.62

* Refinoil unit—American Airlines process.
Bearing Corrosion Data—See Table 8
**Different activated earths used.

Indiana Oxidation Tests (Refinoil Unit—AA Process)

Table 5 is a compilation of Indiana Oxidation tests run (not stirring), not only under the normal standard conditions, i.e., in glass and at 341°F., but also under more severe conditions such as in an iron tube to act as a catalyst and at 450°F. for its accelerated effect. These tests indicate that from an overall standpoint the new oil has a slight edge, though in several instances the re-refined oils are superior. The most obvious point in which the re-refined oils do not come up to the new oils is the increase in viscosity at 210°F. at 100 hours.

Underwood Oxidation and Oxygen Absorption Tests (Refinoil Unit—AA Process)

In Table 6 oxygen absorption values and Underwood oxidation test data are tabulated.

The oxygen absorption values indicating the minutes required for absorption of 3000 cc's of oxygen at 400°F. show the compounded new oil to be considerably more stable than either of the two re-refined and recommended oils; however, both the new and re-refined non-compounded oils are rated about equal.

With respect to the Underwood oxidation tests reference should particularly be made to the low loss in milligrams of Cadmium-Silver by the re-refined oils compared to the new oil; only 50 to 60% of the new oil loss. As regards viscosity rise, the new oil has the edge but when sludge and asphaltenes are compared both new and re-refined oils are quite low.

Bus Engine Sludging Tests (Refinoil Unit—AA Process)

Results of another stability test, known as the Bus Engine Sludging Test, are tabulated in Table 7.

It will be noted from these results that the re-refined oils are substantially equal to the new oils in all respects—in some instances they are slightly better, in others, a little poorer. Bearing corrosion data on this test are included in the next section.

Bearing Corrosion Tests (Refinoil Unit—AA Process)

Table 8 is based on a compilation of several bearing corrosion tests. Any comments relative to these tests should be prefaced by the fact that in service there was never any dif-

Table 8—Bearing Corrosion Tests Comparison of New vs Re-Refined Oil*

SAMPLE No.	NEW OIL (9410)			RCA—08***			RC2—11***			NEW OIL (F—392)			R-22		
COMPOUNDED	YES			YES			YES			NO			NO		
BEST BEARING CORROSION TESTS**															
HRS.	40	75	150	40	75	150	40	75	150	40	75	150	40	75	150
Cu—Pb	335	652	1261	566	1129	1845	...	...	...	...	543	1326	215	617	1312
P. & W.	37	65	127	31	68	118	26	50	75	...	616	1399	174	602	1323
WAC—Pb FLASH	103	221	431	163	324	448	149	251	469	61	317	375	3	35	98
WAC—Pb FLASH & INDIUM	6	18	50	15	31	54	11	50	168	88	180	417	40	142	326
CHRYSLER BEARING MACHINE															
HRS.	5	10	40 75 89½	5	10	15 20 33	5	10	40 75 79½	5	10	40 75 83	5	10	40 72
LOSS—MGS	5	12	50 106 184	5	20	60 125 927	5	12	50 105 150	8	12	23 157 310	12	20	50 300
UNDERWOOD OXIDATION TEST—BEARING CORROSION LOSS (0.01% Fe_2O_3 ADDED) ****															
HRS.	5		10	5		10	5		10						
Cd—Ag LOSS IN MGS.	804		1528	495		994	464		736						

*Refinoil unit—American Airlines process.
**Refer to Table 7 for other tests
***Different activated earths used
****Refer to Table 6 for other data

ference noted, as regards bearing corrosion, between engines operated on new oil only or when operated on a mixture of new and re-refined oils. We present these figures for what they may be worth. It seems to us that a considerable amount of study still needs to be done towards arriving at a satisfactory method for determining bearing corrosion which will to some extent be related to service experience. It is to be regretted that we have no data based on the MacCoull-Ryder machine as operated by experienced personnel. We hope to overcome this lacking detail in the near future.

In reviewing the bearing corrosion data available, a considerable variation is noted. For instance, sample RC2-06 shows up very poorly on the copper-lead loss both by the BEST test and the Chrysler Bearing Machine. The same sample is very good as regards the cadmium-silver loss on the Underwood test. Both the re-refined oil sample R-22 and the new oil sample F-416 show up badly on the BEST test on a Pratt & Whitney bearing; while re-refined oil sample R-22 in the same test but on the Wright lead flash-plated bearing showed considerably less loss than any other new or re-refined oil samples.

Operating (Flight) Experience

No actual flight tests have been specifically made to compare the operating experiences of an engine run on re-refined oil versus new oil due to the fact that re-refined oils are not used in such a manner in service.

Our flight experience has been based on using re-refined oils, as produced at the base stations, in the same manner as new oil would be used; for refills and make-up. Most conclusive in this respect was the use of over 5000 gal. of re-refined oil per month in our aircraft engines operating out of New York during the period August, 1940, through May, 1941.

Fig. 2 shows the effect of combining re-refined and new lubricating oil during normal operations on this basis of varying percentage combinations of re-refined and new oils. Probably that indicated by Curve A would be most indicative of our present service.

Re-Refining Cost Figures

In an attempt to give some substance to operating costs of re-refining operations, we have included Table 9. These figures are based on our operations when using a new oil containing an additive, hence, are slightly more than $.05 per gal. higher than if a straight mineral oil was so treated.

Table 9—Typical Re-Refining Cost Data

(Refinoil unit—American Airlines process)

	Per Gal.
10% Concentrate	$0.0555
Earth (Retrol)	0.0147
Filter Aid (Johns Manville Hyflo Super Cel)	0.0046
Filter paper	0.0034
Labor	0.0418
Depreciation	0.0100
Maintenance	0.0100
Electric (estimated)	0.0100
Total Cost per gal.	$0.1500

As a matter of interest, we might add the following:

We have never approached our maintenance allowance; our depreciation figure is based on a five-year period when operating at approximately half of the possible production capacity of the unit; but the labor cost may be increased by $.01 to $.02 per gal. during these times.

Conservation Possibilities

One of the questions which may logically be raised is that regarding the possible quantities of used oil available for re-refining. This is naturally not an easy question for a layman to answer unless he had access to a considerable amount of data now considered confidential. In the first paragraph of this paper we used for comparative purposes a figure of 10%.

Frankly, this figure may only be 5% or it may be 15 to 20%. We can say this much: In normal air transport operations as carried on during the past four years, a saving of 25% in total oil purchased is possible. This percentage being based on the following factors:

Operating twin-motored equipment, with oil change periods of 100 hours, with 90% of the oil changes being made at a major base, and considering oil consumption at 0.5 gal. per hour per engine. For example, if total oil purchased amounted to 500,000 gal., the amount actually consumed would be approximately 350,000 gal. and the amount drained approximately 150,000 gal. Assuming 90% recovery in the re-refining of these drainings, the amount re-refined would equal 135,000 gal., resulting in an approximate conservation or saving of 25%

As regards the amounts capable of being saved by the aircraft engine and aircraft manufacturers, we can only say that a considerably higher percentage could be conserved by re-refining; say conservatively in the neighborhood of 40 to 50%. This is true because they make very frequent oil changes and the actual consumption in relation to amount drained is low in comparison to air transport operations.

Referring to the military services, we naturally do not have any definite figures available. Consider, however, the above mentioned possibilities and the fact that at training bases the flight time versus oil change periods is no doubt somewhere in between air transport operations and the manufacturers' procedure; that at major maintenance and primary operational points there should not be too much difference from air transport operations, except perhaps for more frequent oil change periods as a safety precaution; then you might realize that a considerable quantity of good oil is now utterly wasted which could be conserved by re-refining. Naturally, airplanes at dispersed points present a different problem; we do not know how the percentage of these compare to the total at the other points mentioned above.

For all types of operations, a figure of 10% seems conservative.

Personal Comments

Though this paper has dealt primarily with aircraft engine lubricating oils the same story could be applied to any heavy duty automotive lubricating oil. We would, therefore, like to add the following personal comments:

After being in the war for nearly a year and preparations having been going on for over two years, there is still a sad lack of appreciation apparently as to how important oil is in this war. Approved re-refining units should be available at all key bases; or use should be made, after thorough investigation naturally,

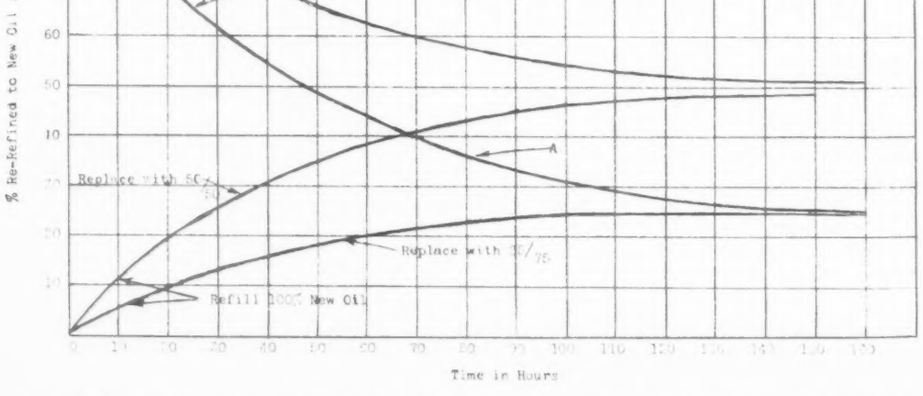


Fig. 2—Effect of combining re-refined and new oil during normal operations on the basis of varying percentage combinations. Curve A is most indicative of present service

of plants locally available within 75 to 125 miles of the subject locations. During the last war most of our Air Corps bases considered it worthwhile to have small reclaiming units and test facilities.

We believe one of the bases has recently had two different types of re-refining units installed; but we do not know that anyone is closely following the actual operation of these units either through laboratory tests to determine compliance with new oil specifications or through engine inspections to determine satisfactory service performance.

A good deal of the cause for this condition can be placed squarely in the lap of the oil industry because of the advice certain of their representatives have given when called upon in a consulting capacity.

The following conclusions and recommendations are based on our personal experience in studying this subject for many years and, if adopted as a unified program preferably by the Army Air Forces, Quartermaster Corps, Ordnance Department, WPB, OPC, and others, or at least by some one qualified group in each branch, they would result in definite answers within a very few months.

Conclusions

A—Crankcase oils drained from automotive equipment—ground or aircraft—operated by the Army Air Force, Navy Quartermaster Corps, or Ordnance Department may readily be re-refined to new oil specifications; providing a proper type unit and a correct process is employed. A job as thorough as this should only be done at base and reserve depots. If required, additives may satisfactorily be added to meet the original new oil specifications. In some, though few, domestic localities advantage could be taken of now existing commercial re-refining plants.

B—For treating drained crankcase oils in the field, if desired, no attempt should be made to re-refine the oil, but rather a thorough job of reclamation only should be done. This would be more in the nature of extending oil drain periods and might be accomplished by using small portable equipment such as a centrifuge or filtration units which would not remove any additive.

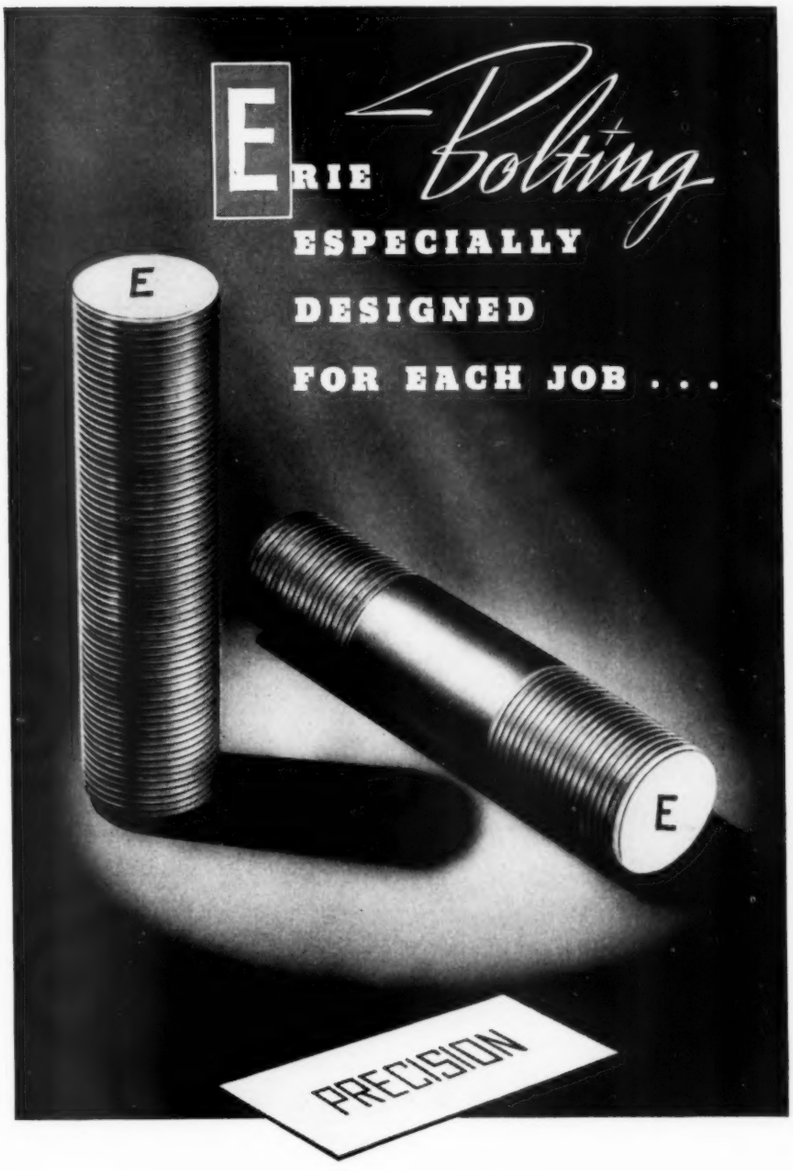
C—Specialized personnel are not required, only men with good common sense, plus approximately three weeks training.

Recommendations

Immediate steps should be taken to obtain test data on small practicable re-refining units currently manufactured to a standard design and following a well planned program. This program should be flexible enough to obtain as much data in as short a time as possible and should include not only routine laboratory tests but at least two or three stability or oxidation tests of the oil produced from each unit.

Acknowledgment

The author wishes to acknowledge his appreciation to the Wright Aeronautical Corp. and the Sinclair Refining Co. and their personnel who furnished a major part of the test data presented.



Our business has always been the making of bolts, studs and nuts to specifications with emphasis on the specials. Our customers are legion; 25 pieces here, a hundred there, and thousands for that special refinery-synthetic plant.

Today your Boss is our Boss and when we ask old customers to be patient, you know what we mean. We are working 100%, day and night, on vital war work, which as you know is scheduled by Uncle Sam with the one thought of winning the war, not of winning or holding good will. That part of business is reserved for peacetime.

SPEED THE DAY OF VICTORY — BUY BONDS

ERIE BOLT & NUT CO
ERIE, PA., U. S. A.

Catalytic Vapor-Phase Alkylation Of Benzene with Ethylene*

By W. A. Pardee** and B. F. Dodge***

Results are given of reactions between ethylene and benzene vapors under the influence of various catalysts to form ethylbenzene principal intermediate in the production of styrene, which is now in demand in increasing volumes in the manufacture of synthetic rubber and resins.

Sodium-aluminum chloride-pumice and phosphoric acid-kieselguhr, among 11 different catalysts used, were the only ones giving detectable reactions. The former under some conditions converted as much as 95% of the ethylene to ethylbenzenes. This catalyst was found to have a short life: the ethylene conversion decreasing from 93 to 75% over a period of time necessary for the conversion of 0 to 1.16 gram moles of ethylene to ethylbenzenes.

Pressure had a surprising influence on the reaction. At atmospheric pressure there was no detectable conversion, while at 200 p.s.i. (gage) as much as 95% of the ethylene was converted to ethylbenzenes. The effect of space velocity on the conversion was negligible over the range of 11-50 cc./hr./cc. of catalyst.

WITH the development of the uses of styrene over the past few years in the manufacture of resins and synthetic rubber, processes by which it might be synthesized have been of interest. Monoethylbenzene, when dehydrogenated, produces styrene by the reaction:

$$C_6H_5C_2H_5 \xrightarrow[\text{Catalyst}]{\text{Heat}} C_6H_5CH=CH_2+H_2 \quad (A)$$

It is believed that the most important processes in operation at this time for the manufacture of styrene involve monoethylbenzene as the starting material. The large producers of ethylbenzene use an agitated, liquid phase for contacting benzene with ethylene in the presence of a metal halide catalyst, such as aluminum chloride. Recently, a process for the production of ethylbenzene from ethyl alcohol and benzene has been publicized. It is not believed, however, that this process is as yet producing commercial quantities of ethylbenzene.

The present investigation is concerned with the reaction of ethylene with benzene in the vapor phase utilizing an apparatus in which the mixed vapors of ethylene and benzene pass through a catalyst bed where the reaction takes place. Since only one investigator, Komarewsky (13), has reported results on this vapor-phase flowing system, the data on the effect of different operating variables, such as pressure, temperature, and catalyst, are very meager. It has been the object of this investigation to find a suitable catalyst to promote the reaction of ethylene with benzene in the vapor phase to form predominantly monoethylbenzene:

$$C_6H_6(g)+C_2H_4(g) \rightleftarrows C_6H_5C_2H_5(g) \quad (B)$$

which might be dehydrogenated to form styrene as indicated in reaction (A). After finding a suitable catalyst for the reaction, the next object has been to study the action of this catalyst under various conditions of pressure, temperature, and space velocity.

Previous Work

The alkylation of benzene with olefins has been quite widely investigated, but most of the work has been confined to liquid-phase, batch experiments. The only work of note reported in the literature in which a vapor-phase, flow system was employed is that of Komarewsky (13). A dehydrogenation catalyst, nickel-alumina, was used in this experiment, and vapors of ethylene and benzene at 350°C. and atmospheric pressure were passed over this catalyst. Analysis of the liquid product led to the conclusion that 5% of the benzene charged was converted to toluene. The remainder was unconverted benzene and some high boiling residue, representing about 2% of the benzene charge and identified as a mixture of naphthalene and diphenyl. The gas produced by the reaction consisted of hydrogen, methane and ethane. When benzene alone was passed over the catalyst under the same conditions only a small fraction of it reacted, the products being diphenyl and hydrogen. Ethylene, alone, under the same conditions was completely decomposed to form carbon, hydrogen, methane, and ethane. According to previous results of Ipatieff and Komarewsky (10), ethylbenzene in the presence of the nickel-alumina catalyst at 350°C. decomposed to toluene and methane.

Much work has been done on the benzene-ethylene reaction in which a liquid phase was present. Results of these investigations show that such materials as metal halides, inorganic acids, and acid anhydrides (such as P_2O_5) catalyze the reaction with the resulting formation of ethylbenzenes, from the mono- to the hexaethylbenzene. Low temperatures favor the formation of these ethylbenzenes, but good conversions have been obtained up to 300-400°C. As would be expected, greater conversions occur at high pressures than at low pressures. (Pressures up to 60 atmospheres have been reported for the benzene-ethylene reaction.) Since all of the published data resulted from investigations carried out in a batch process wherein a constant pressure of ethylene was maintained on the reaction mixture for periods of 12 to 60 hours, it is meaningless to give definite conversion figures without giving complete details of the experiments; these details are beyond the scope of this paper. However, it may be said that benzene conversions to mono-, di- and higher alkylbenzenes were as high as 100% under certain conditions.

It has been generally concluded that the metal halides are the best catalysts for the aromatic-olefin condensations. Many investigators, dating back to Balsohn in 1879 (2), have studied the catalytic effect of these metal halides under various conditions of pressure, temperature, and ratio of reactants. Some of these recent investigators include Ipatieff and Grosse (9) (6), Huber and Reid (7), Milligan and Reid (16) (17), and Amos, Dreisbach and Williams (1).

Among the inorganic acids which have been tested as catalysts for the benzene-olefin condensations are sulfuric, o-phosphoric and hydrofluoric acids. Ipatieff, Corson, Pines (8) and Wunderly, Sowa, Nieuwland (24) have reached the conclusion that sulfuric acid does not catalyze the benzene-ethylene reaction but does catalyze the reaction between benzene and olefins of three or more carbon atoms. Ipatieff, Pines and Komarewsky (11) found that o-phosphoric acid catalyzed the benzene-ethylene reaction. Hydrofluoric acid was tested by Simons and Archer (20) (21), and Calcott, Tinker and Weinmayr (5) and was found to promote the reaction of benzene with olefins of three or more carbons, but these investigators do not mention the use of hydrofluoric acid with benzene and ethylene.

The acid anhydride, phosphorus pentoxide, has been used by Malishev (14) (15), and by Truffault (23) to effect condensation.

The products resulting from the reaction of benzene with ethylene in the presence of a liquid phase consist essentially of mono- to hexaethylbenzenes. The catalysts mentioned in the above discussion seem to exhibit very little difference in selectivity in the range of conditions where they are appreciably active.

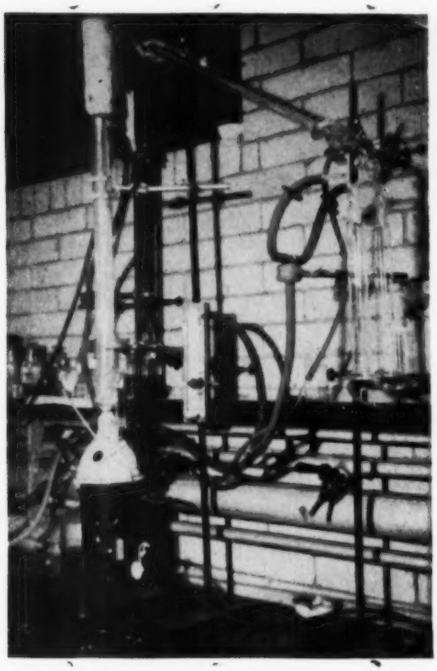
Thermodynamics of the Reaction

The "best" available thermal data have been used to calculate an equilibrium constant for the reaction between ethylene and benzene in the vapor phase to form monoethylbenzene (vapor);

* Presented as part of the symposium on Unit Processes before the Division of Industrial and Engineering Chemistry, 104th meeting of American Chemical Society, Buffalo.

** Gulf Research & Development Co., Pittsburgh.
*** Yale University, New Haven, Conn.

Synthesis apparatus for vapor-phase alkylation of benzene with ethylene



Fractionating column of the apparatus

$$C_6H_6(g) + C_2H_4(g) \rightleftarrows C_6H_5C_2H_5(g) \quad (B)$$

The only data lacking for this calculation are the specific heat data for ethylbenzene vapor. By subtracting the specific heat equation of methanol vapor (19) from the equation of ethanol vapor (19) the effect of adding a $-CH_2-$ group to a carbon chain was evaluated. Then by adding the equation for this $-CH_2-$ group to the specific heat equation of toluene (19) the following equation was obtained:

$$C_p = 10.3 + 0.072\ T$$

This equation should represent the specific heat of ethylbenzene. The units for this equation are gram calories, degrees Kelvin, and gram moles.

In Table 1 are tabulated the data from which the following equation for the calculation of the equilibrium constant, K_p, as a function of temperature may be derived:

$$\log_{10} K_p = \frac{5800}{T} + 5.475 \times 10^{-4} T - 1.11 \log_{10} T - 3.691 \quad (C)$$

Table 2 contains equilibrium constants, K_p, calculated from equation (C) for the reaction (B). Calculations based on a 1:1 molal ratio of ethylene to benzene, atmospheric pressure and 327°C. indicate that at equilibrium more than 99% of the ethylene should be converted to ethylbenzene.

Catalysts

Eleven different catalysts have been prepared and tested. In these preparations, outlined very briefly below, the following materials were used unless otherwise specified:

Charcoal—activated, animal, 6-20 mesh, J. T. Baker Chemical Co.

Alfrax—10-16 mesh, Carborundum Co.

Phosphoric Acid—85% (Sp. gr. 1.71), J. T. Baker Chemical Co.

Boric Acid—H_3BO_3, Howe and French, Inc.

Sulphuric Acid—96% reagent

Zinc Sulfate — $ZnSO_4.6H_2O$, technical grade, Merck & Co., Inc.

Sodium Phosphate—$Na_2HPO_4.12H_2O$, Baker & Adamson

Strontium Chloride — $SrCl_2.6H_2O$, C. P. granular, J. T. Baker Chemical Co.

Zinc Chloride—$ZnCl_2$, C. P. granular, J. T. Baker Chemical Co.

Ferric Chloride—$FeCl_3 . 6H_2O$, C. P. granular, Eimer & Amend

Aluminum Chloride — $AlCl_3$, anhydrous, Mallinckrodt Chemical Works

Silver Sulfate—Ag_2SO_4, C. P. Powder, J. T. Baker Chemical Co.

Water—distilled

The percent catalytic material referred to in each case is based on the difference between the total weight of catalyst and the weight of support (charcoal, alfrax, etc.) used. Solutions are aqueous unless otherwise specified.

Z-1, Phosphoric Acid Kieselguhr—This was the regular Universal Oil Products Co. polymerization catalyst. Minute details for the preparation of this catalyst are not available, but, from the information obtained, it was concluded that a 3:1 weight mixture of phosphoric acid and kieselguhr was extruded from an ⅛-in. orifice into pellets which were baked at 200-260°C. A catalyst prepared in this manner was tested in the synthesis unit and was found to give results almost identical with those obtained when the U.O.P. catalyst was used.

Z-2, Phosphoric Acid-Charcoal—Phosphoric acid was poured over charcoal, and the mixture (1.5:1 weight ratio of acid to charcoal) was heated at 250-280°C. for 17 hours and at about 370°C. for one hour, after which heat treatment the material was dry at room temperature and contained about 42% acid.

Z-3, Boron Phosphate - Phosphoric Acid-Charcoal—A 14.9% boric acid solution was

TABLE 2—Equilibrium Constants

$C_6H_6(g) + C_2H_4(g) \rightleftarrows C_6H_5C_2H_5(g)$

Temperature °K	Temperature °C.	$\log_{10} K_p$	K_p
298.1	25	13.22	1.66×10^{13}
350.1	77	10.28	1.91×10^{10}
400.1	127	8.14	1.38×10^{8}
500.1	227	5.18	1.51×10^{5}
600.1	327	3.22	1.66×10^{3}

TABLE 1—Thermal Data*

Compound	State	Heat of Vaporiztion	Heat of Formation	Standard Free Energy of Formation	Specific Heat (19)
Ethylene	Gas	. . . . .	11,975 (18)	15,840 (18)	$C_p = 6 + 0.015T$
Benzene	Liquid	8100 (19)	11,630 (19)	. . . . .	. . . . .
Benzene	Gas	. . . . .	. . . . .	30,640 (19)	$C_p = 6.5 + 0.052T$
Ethylbenzene	Liquid	9900 (12)	—5,070 (19)	. . . . .	. . . . .
Ethylbenzene	Gas	. . . . .	. . . . .	28,460 (19)	. . . . .
Methyl Alcohol	Gas	. . . . .	. . . . .	. . . . .	$C_p = 2 + 0.030T$
Ethyl Alcohol	Gas	. . . . .	. . . . .	. . . . .	$C_p = 4.5 + 0.038T$
Toluene	Gas	. . . . .	. . . . .	. . . . .	$C_p = 7.8 + 0.064T$

*Units are gram calories, °K. and gram moles. The reference temperature and pressure are 298.1°K and 760 mm. mercury, respectively.

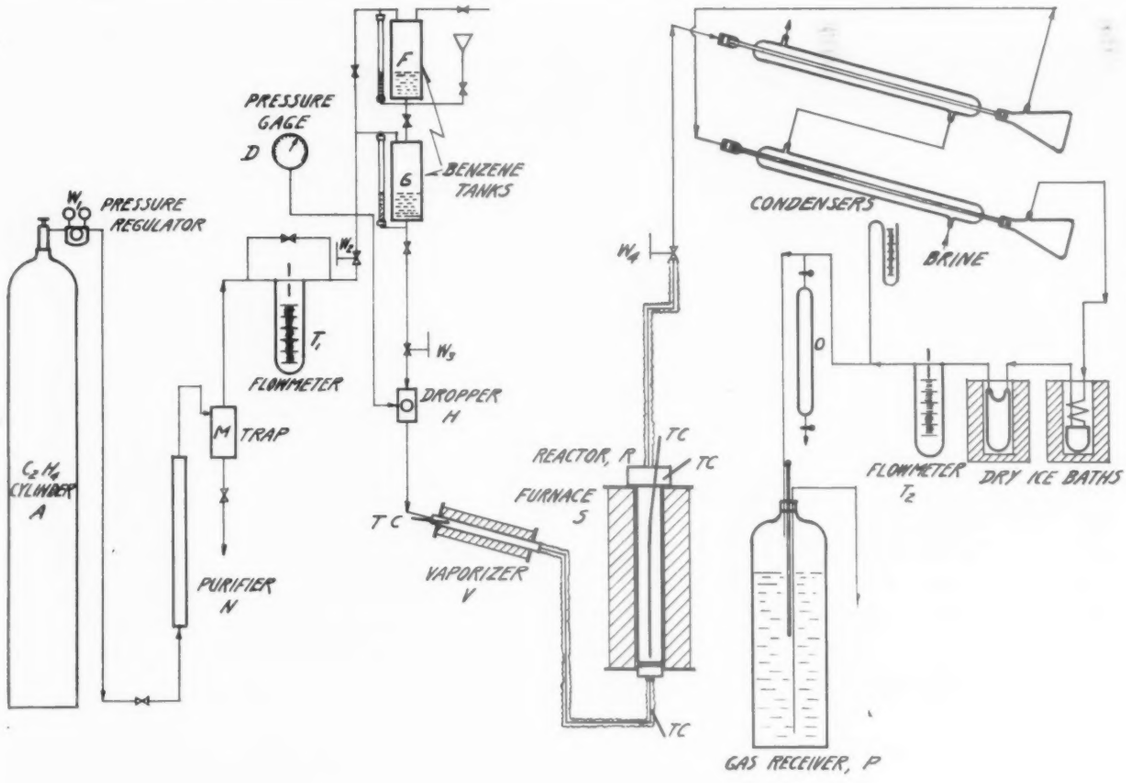


Fig. 1—Flow diagram for synthesis apparatus, ethylene-benzene vapor-phase reaction

poured over a phosphoric acid-charcoal mixture and heated with stirring to 240°C. (5½ hours heating time). The weight ratio of boric acid solution to 85% phosphoric acid to charcoal was 3:1:1.6. The resulting catalyst contained approximately 18% catalytic material.

Z-4, Phosphoric Acid - Sulphuric Acid-Charcoal—A solution of phosphoric acid and concentrated sulfuric acid was poured over charcoal (11.1:1:9.3 weight ratio). This mixture was heated with stirring at 200°C. for about 30 minutes. The excess liquid was then separated from the solid by filtration through glass wool; then the solid material was heated at 213°C. for 1½ hours. The resulting mixture contained about 21% catalyst.

Z-5, Zinc Phosphate Pellets — Zinc phosphate was precipitated from a hot 56.5% $Zn_2SO_4.6H_2O$ solution by addition of a hot 52.5% solution of $Na_2HPO_4.12H_4O$. The weight ratio of sulfate to phosphate solution was 1.1:1. The precipitate was filtered from the mixture and was washed several times with a total of about 0.5 weight of water (based on phosphate solution) followed by drying at 110°C. for 11 hours. About 3% by weight of graphite was incorporated in the powder to act as a binder; then the mixture was made into pellets 7/32 in. in diameter by ⅛ in. long.

Z-6, Strontium Chloride-Charcoal — A hot 16.7% solution of $SrCl_2.6H_2O$ was poured over charcoal (weight ratio of 2.8:1). This mixture was heated, with frequent mixing, over a hot plate until practically dry, and was then dried for 30 minutes at 110°C. Catalytic material contained in the mass was about 30%.

Z-7, Zinc Chloride-Alfrax — Alfrax was stirred into a 50% $ZnCl_2$ solution (1.75:1 weight ratio). The mixture was stirred, allowed to stand for several minutes, filtered over glass wool and dried at 110°C. for about 40 hours. The resulting material contained about 14.1% catalyst.

Z-8, Ferric Chloride-Alfrax — The method employed in the preparation of this catalyst was similar to that used in Z-7. Hydrogen chloride was evolved during the drying operation resulting in the formation of iron oxide. For this reason the material was dried for only 1¾ hours at 103°C. The resulting mass contained about 10% catalyst.

Z-9, Sodium-Aluminum Chloride-Pumice—The method employed in the preparation of this catalyst was similar to that used by Blunck and Carmody (4). The sodium-aluminum chloride salt consisted of approximately a 1:1 molal complex of aluminum chloride and sodium chloride. The complex was made by fusing the salts (with a slight excess of aluminum chloride to take care of sublimation loss in the early stage of the heating process) in a pressure bomb at temperatures up to 265°C. After cooling to room temperature the bomb was opened and heated again to drive off the excess aluminum chloride. The fused salt was then poured over an equal weight of dry pumice (8-10 mesh) with thorough mixing. The final catalyst contained about 50% catalytic material. This material was very hygroscopic and necessitated storage in a gas tight container until it was placed in the catalyst chamber. The catalysts listed in Table 3, e.g., catalyst **Z-9a,Z-9c**, etc. were all prepared according to the above procedure. The different letters attached to these Z-9 catalysts signify different batches of catalyst.

Z-10, Sulphuric Acid-Alfrax — Alfrax was stirred into a 77% solution of H_2SO_4; the mixture was heated for one hour at 100°C. and was then filtered over glass wool. The solid was heated for 4 hours until the temperature reached 300°C. After this treatment, the catalytic content was about 26%.

Z-11, Silver Sulphate-Sulfuric Acid-Alfrax—The method employed in the preparation of this catalyst was similar to that employed by Stanley, Youell and Dymock (22) and by Bliss and Dodge (3). By saturating alfrax with a solution of silver sulfate and sulphuric acid, filtering and drying the residue, a material was produced which contained about 4% silver sulfate and about 21% sulfuric acid.

Apparatus and Procedure

The ethylene used in this work came from U. S. Industrial Chemical, Inc., and was of at least 99% purity (prepared by dehydration of ethanol over phosphoric acid). The benzene used was Merck's, nitration grade having been further fractionally distilled.

In Fig. 1, a flow diagram for the synthesis unit is shown. Ethylene passed from cylinder, A, through the pressure regulating valve, W_1, purifier, N, trap, M, flowmeter, T_1, expansion valve, W_2, and into the benzene dropper, H. The ethylene-benzene mixture passed from vaporizer, V, leaving as vapors, and entering reactor, R, from which the reaction product was expanded through valve, W_4, to practically atmospheric pressure. The reaction mixture then passed into a condenser system from which emerged the gaseous product. This flow of gaseous product was noted on flowmeter, T_2, sampled continuously by gas sampler, O, and finally measured by displacement of brine solution from the gas receiver, P. The benzene liquid was fed from tank, G, by gravity into dropper, H, where it mixed with the ethylene, and passed thence through the apparatus as noted above.

The flow rates were controlled by ¼ in., V-point, needle valves. The ethylene was throttled through valve, W_2, from a pressure usually 50-100 pounds per square inch higher than the reactor pressure. The flow rate was

TABLE 3—Summary of Data

Run No.	4	12	19a	19b	19c	19d	20b	20c	20d	23
Catalyst, Z—°	1	9a	9d	9d	9d	9d	9c	9c	9c	9i
Pressure (lbs./sq. in. gage)	100	100	100	100	100	100	200	100	50	200
Temperature (°C.)	239	246	242	239	239	238	266	266	267	268
Space Velocity°°	27.2	26.6	22.1	21.7	25.3	25.8	19.4	31.5	37.1	19.9
C_6H_6:C_2H_4 Molal Ratio	1.34	1.83	2.07	1.95	1.43	1.73	2.34	2.20	2.28	2.12
Duration (Minutes)	300	195	180	180	180	180	180	120	120	120
C_6H_6 Feed Rate (gms./hr.)	17.3	19.3	14.1	14.4	18.4	16.3	13.2	14.9	17.9	7.1
Liquid Product Analysis (Vol. %):										
Benzene	85.4	64.2	62.1	64.2	62.7	68.6	60	76.3	92.9	62.3
Monoethylbenzene	13.5	22.8	32.1	27.9	16.3	21.4	30.8	14.4	7.1	32.5
Diethylbenzene	1.1	7.0	5.8	7.9	11.3	10.0	9.2	9.3	0	5.2
Higher Ethylbenzenes	0	6.0	0	0	9.7	0	0	0	0	0
Gaseous Product Analysis (Vol. %):										
Hydrogen	0	6.8	16.6		7.0		46.7	4.8		0.8
Ethane	0	5.3	8.8		7.8		27.3	3.7		22.7
Ethylene	98.6	86.1	73.4		83.7		24.3	90.3		75.0
Acid Gases (SO_2, CO_2, HCl)	1.4	1.8	1.2		1.5		1.7	1.2		1.5
Percent C_2H_4 Converted:										
To Monoethylbenzene	12.8	34.7	54.4	44.3	19.7	29.9	59.7	24.8	16.3	56.1
To Diethylbenzene	1.6	17.1	15.5	19.6	21.5	22.2	28.4	25.5	0	14.1
To Higher Ethylbenzenes (Calculated as Tri-)	0	17.6	0	0	23.2	0	0	0	0	0
Total % C_2H_4 Converted	14.4	69.4	69.9	63.9	64.4	52.1	88.1	50.3	16.3	70.2

°Different letters attached to the Z-9 catalysts signify different batches of catalyst.
°°Space velocity expressed as cc. vapor at 0°C., 760 mm./hr./cc. catalyst.

Run No.	24	25	26	27	29	30	31a	31b	31c	31d	32
Catalyst, Z—°	9i	9i	9i	9i	9i	9i	9i	9i	9i	9i	9i
Pressure (lbs./sq. in. gage)	200	100	0	50	200	200	200	200	200	200	200
Temperature (°C.)	268	268	268	268	268	268	268	268	268	268	268
Space Velocity°°	28.8	37.6	53.8	53.1	29.2	39.3	47.2	49.3	57.3	50.2	11.6
C_6H_6:C_2H_4 Molal Ratio	2.04	1.91	2.22	2.91	1.77	1.92	2.54	2.00	2.04	1.93	1.61
Duration (Minutes)	150	120	120	120	120	120	120	90	90	90	300
C_6H_6 Feed Rate (gms./hr.)	15.6	21.0	32.3	31.7	15.1	20.8	26.3	27.4	32.6	28.1	5.2
Liquid Product Analysis (Vol. %):											
Benzene	57.5	64.4	100	93.3	50.7	52.5	59.0	59.5	63.2	63.3	43.5
Monoethylbenzene	31.5	21.2	0	6.7	31.3	32.6	30.2	26.7	23.2	22.6	39.6
Diethylbenzene	9.2	9.6	0	0	13.2	11.3	7.9	9.4	8.8	9.2	14.5
Higher Ethylbenzenes	1.8	4.8	0	0	4.8	3.6	2.9	4.4	4.8	4.9	2.4
Gaseous Product Analysis (Vol. %):											
Hydrogen	6.6	0.2	0	0.7	1.5	0	16.4		3.3		2.4
Ethane	11.0	15.7	0	1.4	18.8	54.5	28.7		15.4		66.0
Ethylene	81.0	83.5	100	97.0	78.3	42.9	52.7		80.0		29.7
Acid Gases (So_2, CO_2, HCl)	1.4	0.6	0	0.9	1.4	2.6	2.2		1.3		1.9
% C_2H_4 Converted:											
To Monoethylbenzene	54.1	33.8	0	14.3	48.2	53.7	64.7	44.8	39.3	36.1	54.2
To Diethylbenzene	25.1	23.9	0	0	31.9	29.5	26.9	25.1	23.4	23.4	32.6
To Higher Ethylbenzenes (Calculated as Tri-)	5.8	14.8	0	0	14.3	12.1	1.6	14.1	16.2	15.6	7.0
Total % C_2H_4 Converted	85.0	72.5	0	14.3	94.4	95.3	93.2	84.0	78.9	75.1	93.8

°Different letters attached to the Z-9 catalysts signify different batches of catalyst.
°°Space velocity expressed as cc. vapor at 0°C., 760 mm./hr./cc. catalyst.

noted by reading a pressure differential on manometer, T_1, developed by passage of the gas through a short capillary tube. The benzene flow rate was regulated by valve, W_3 and noted by counting drops falling through sight glass and dropper, H. The reactor pressure was maintained by throttling the reaction vapors through valve, W_4.

The liquid product was fractionated at atmospheric pressure through a ½ in. glass, vacuum-silver-jacketed column packed with 24 inches of 3/16 in. stainless steel rings. The various cuts were identified by refractive index measurements as well as by their boiling points.

The effluent gases were analyzed by means of a standard U. S. Steel gas analysis set.

Each catalyst was tested by passing through the catalyst bed a mixture of benzene and ethylene vapors in molal ratio of about 2:1, at temperatures of 228 to 245°C., gage pressure of 100 p.s.i. and vapor space velocities of 25 to 40 cc. (0°C. and atmospheric pressure) per hour per cc. of catalyst. Sixteen runs were made in this preliminary catalyst study, and only two of the catalysts were found to promote a detectable reaction between the ethylene and benzene (the phosphoric acid-kieselguhr and the sodium-aluminum chloride-pumice catalysts.).

Following the preliminary catalyst study, the sodium-aluminum chloride-pumice catalyst was investigated in further detail. The activity of this catalyst was studied over a period of time, and the pressure and space velocities were varied in a series of runs. In the investigation of the effect of pressure on the reaction, gage pressures of 0, 50, 100, and 200 p.s.i. were employed. The effect of space velocity was studied over the range 11.6 to 47.2 cc./hr./cc. of catalyst (contact times of about 20 to 5 minutes.).

A summary of the runs in which reaction was noted is given in Table 3. No data are listed for the catalyst test runs where no reaction occurred, but it may be assumed that the operating data and analytical procedures were similar to those listed under Runs 4 and 12.

Since the yields of triethylbenzene were only estimated from the distillation residue they are not plotted as separate curves in Figs. 2, 3 and 4. However, they are contained in the "total" conversion curves in these figures. This explains why the sum of the "mono" and "di" ordinates are not always equal to the "total" ordinates.

Preliminary Catalyst Study

Phosphoric acid supported on kieselguhr was the first catalyst to be tested. The results indicate that 13-15% of the ethylene was converted to ethylbenzene, predominantly monoethylbenzene with small amounts of diethylbenzene (about 10:1 weight ratio). Since pressure has been found to have such a pronounced effect on the reaction when the sodium-aluminum chloride-pumice catalyst was used, this phosphoric acid-kieselguhr catalyst would probably give very satisfactory conversions at pressures of 300-400 p.s.i.

Phosphoric acid in forms other than that mentioned above (with kieselguhr) failed to promote any noticeable reaction. Thus, phosphoric acid-charcoal, boron phosphate-phosphoric acid-charcoal, and phosphoric acid-sulfuric acid-charcoal all failed to cause ethylene and benzene to react at 100 p.s.i. and about 240°C.

Sulphuric acid supported on alfrax was inactive as was also the mixed catalyst, silver sulfate-sulfuric acid-alfrax. Thus, it stands that sulphuric acid, even though it is a good catalyst for benzene alkylation by olefins of three or more carbon atoms in the liquid phase, does not promote the reaction of ethylene and benzene either in the vapor phase or liquid phase.

Strontium, zinc, and ferric chlorides supported on activated charcoal, alfrax, and alfrax, respectively, were found to be inactive in the form employed. Aluminum chloride, in the form of a fused, equimolar mixture with sodium chloride supported on pumice, was found

TABLE 4—Catalyst Activity

Run	Total Gram Mols Ethylene Converted	Pressure (p.s.i. gage)	Percent Ethylene Converted To: Mono-	Di-	Tri-	Total
19a	0.131	100	54.4	15.5	0	69.9
19b	0.383	100	44.3	19.6	0	63.9
19c	0.683	100	19.7	21.5	23.2	64.4
19d	0.991	100	29.9	22.2	0	52.1
31a	0.180	200	64.7	26.9	1.6	93.2
31b	0.521	200	44.6	25.1	14.1	84.0
31c	0.851	200	39.3	23.4	16.2	78.9
31d	1.164	200	36.1	23.4	15.6	75.1

to be quite active, giving an ethylene conversion of about 69% under the same conditions that the other catalysts were tested (100 p.s.i., 246°C., 26.6 cc./hr./cc. catalyst).

Study of Sodium-Aluminum Chloride-Pumice Catalyst

Under the conditions of these tests, the sodium-aluminum chloride was in the liquid state; therefore, it was necessary to support the material on a carrier. Pumice (8-10 mesh) was used as the carrier, but was not satisfactory because of its varying properties from one lot to another. For example, two different lots of pumice were used; one gave an active and the other an inactive catalyst. It was concluded that the variation in activity was due to the difference in density of the two lots. The more active catalyst was prepared from the less porous lot (density of about 0.46 grams/cc.), and its greater activity may be attributed to a greater and thicker catalytic surface on this pumice than on the more porous material (density of about 0.26 grams/cc.). Some "prepared" carrier would probably be much better than the pumice, but due to a lack of time, other carriers were not tested except for one test with activated alumina. In this test, the ratios of materials were the same as with pumice, but this catalyst gave only about 20% conversion. It is believed, however, that the only function of these different carriers is to support the catalyst, and that with the same area and thickness of catalytic surface the carrier material would have no effect on the reaction. Tests were made to show that the pumice and the alumina alone had negligible catalytic effect on the benzene-ethylene mixture under the conditions used.

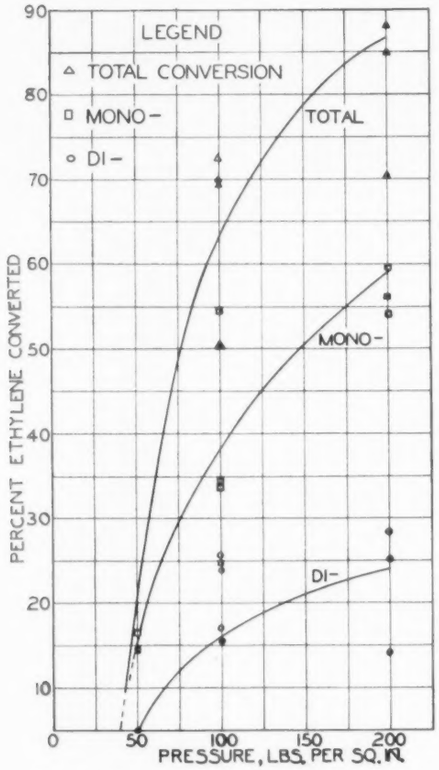


Fig. 3—Effect of pressure on conversion

In order to determine the effect of the catalyst on the individual reactants the benzene and ethylene vapors were passed, separately, through the catalyst bed with the result that the benzene vapors were unaffected, and the ethylene was decomposed slightly, giving about 2% ethane and 0.5% hydrogen in the effluent gas.

Catalyst Activity — Runs 19 and 31 were made to determine the activity of the catalyst over a period of time at 100 and 200 p.s.i., respectively. The data used to plot Fig. 2 are tabulated in Table 4, and illustrate the decrease in activity of the catalyst as a function of moles of ethylene converted.

It is noted that there was a decrease in total conversion from 93% to 75% resulting from the conversion of about 0.18 to 1.16 gram moles of ethylene to ethylbenzene. There are indications that the formation of higher ethylated benzenes is favored with use of the catalyst over a period of time.

Pressure as a Variable—Runs were made at gage pressures of 0, 50, 100, and 200 p.s.i. A 300-p.s.i. run was attempted, but the capacity of the benzene vaporizer was not sufficient for operation at this pressure.

The great effect of pressure on the reaction is shown in Fig. 3. It will be noted that conversion ranged from 0% at atmospheric pressure to about 90% at 200 p.s.i. gage pressure. Since the points in this plot are quite scattered, the reliability of the different analyses has been evaluated, and the points were "weighed" accordingly in drawing the curve to best represent the true conditions.

Space Velocity as a Variable—The vapor space velocity was varied from 47.2 to 11.6 cc. (vapor, calculated at 0°C. and atmospheric pressure) per hour per cc. of catalyst. The data for these runs are plotted in Fig. 4. It is concluded that the total conversion of ethylene to ethylbenzenes was independent of the space velocity in the range studied. However, there are indications that more of the mono- and less of the diethylbenzenes are produced at the higher than at the lower velocities.

Literature References

(1) Amos, J. L., Dreisbach, R. R., and Williams, J. L., (to Dow Chemical Co.), U. S. Patent 2,198,595 (April 30, 1940).
(2) Balsohn, M. M., Bull. Soc. Chim., (2), 31, 539 (1879).
(3) Bliss R. H., and Dodge, B. F., IND. ENG. CHEM., 29, 19 (1937).
(4) Blunck, F. H., and Carmody, D. R., IND. ENG. CHEM., 32, 328 (1940).
(5) Calcott, W. S., Tinker, J. M., and Weinmayr, V., J. Am. Chem. Soc., 61, 1010 (1939).
(6) Grosse, A. V., and Ipatieff, V. N., J. Org. Chem., 1, 559, (1937).
(7) Huber, F. C., and Reid, E. E., IND. ENG. CHEM., 18, 535 (1926).
(8) Ipatieff, V. N., Corson, B. B., and Pines, H., J. Am. Chem. Soc., 58, 919 (1936).
(9) Ipatieff, V. N., and Grosse, A. V., J. Am. Chem. Soc., 58, 2339 (1936).
(10) Ipatieff, V. N., and Komarewsky, V. I., J. Am. Chem. Soc., 58, 922 (1936).
(11) Ipatieff, V. N., Pines, H., and Komarewsky, V. I., IND. ENG. CHEM., 28, 222 (1936).
(12) Kolosovski, N. A., and Mezhenin, I. S., Bull. Soc. Chim., 49, 1461 (1931).
(13) Komarewsky, V. I., J. Am. Chem. Soc., 59, 2715 (1937).
(14) Malishev, B. W., J. Am. Chem. Soc., 57, 883 (1935).
(15) Malishev, B. W., (to Shell Dev. Co.), U. S. Patent 2,141,611 (Dec. 27, 1938).
(16) Milligan, C. H., and Reid, E. E., IND. ENG. CHEM., 15, 1048 (1923).
(17) Milligan, C. H., and Reid, E. E., J. Am. Chem. Soc., 44, 206 (1922).
(18) Parks, G. S., Chem. Rev., 18, 325 (1936).
(19) Parks, G. S., and Huffman, H. M., "Free Energy of Some Organic Compounds", A. C. S. Monograph No. 60, New York, Chemical Catalog Co., 1932.
(20) Simons, J. H., and Archer, S., J. Am. Chem. Soc., 60, 2952 (1938).
(21) Simons, J. H., and Archer, S., J. Am. Chem. Soc., 60, 986 (1938).
(22) Stanley, H. M., Youell, J. E., Dymock, J. B., J. Soc. Chem. Ind., 53, 205T (1934).
(23) Truffault, R., Compt. rend., 202, 1286 (1936).
(24) Wunderly, H. L., Sowa, F. J., and Nieuwland, J. A., J. Am. Chem. Soc., 58, 1007 (1936).

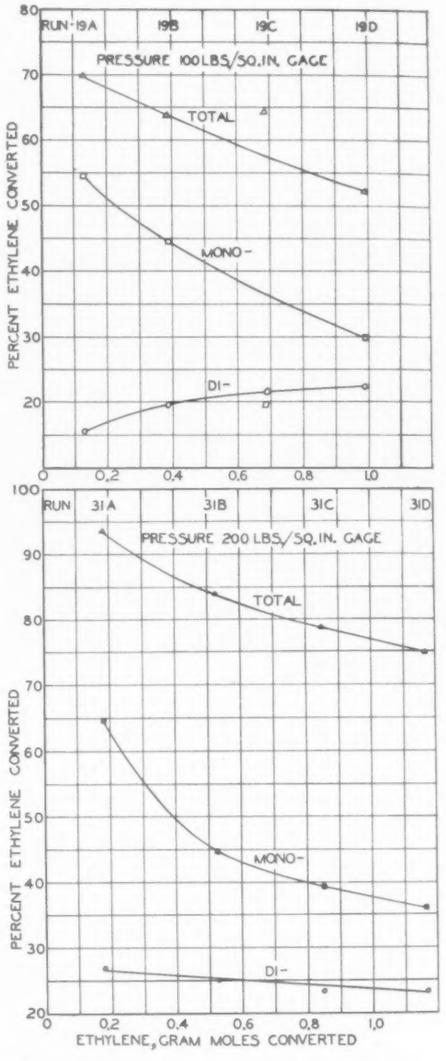


Fig. 2—Decrease in catalyst activity with amount of ethylene converted

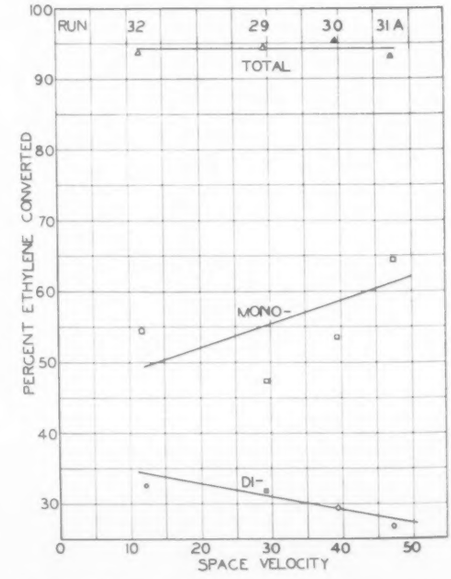


Fig. 4—Effect of space velocity on conversion

Technique of Metallizing To Protect Equipment from Wear and Corrosion

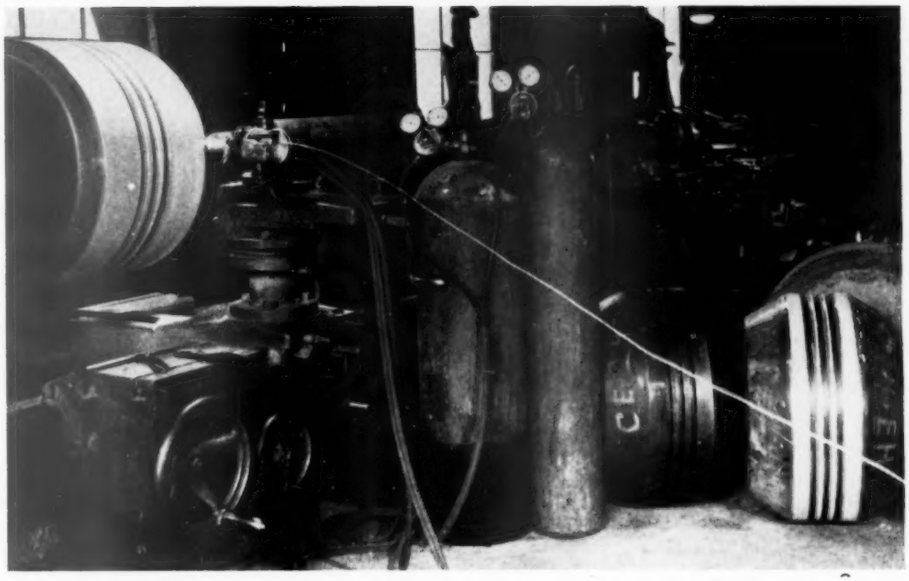


Fig. 3—Large gas compressor piston being metallized with bronze. At right may be seen 2 other pistons in various stages of metallizing

SINCE the war started, refiners are finding metal spraying a necessity rather than a convenience in a host of every day applications in the maintenance of plant and equipment, said J. E. Young, Sr., of the General Metallizing and Machine Co., Houston, in a report presented before a regional technical meeting of the Western Petroleum Refiners Assn.[1] "By its use worn parts can be repaired and put back in service in about the time it would take to get a requisition to the purchasing department for a new part," he said.

Another present day advantage cited for refiners is that the metallizing equipment is now designed so that liquefied petroleum gases which are available at many refineries can be used as fuel in fusing the metal. "The equipment has been continually improved so that the work can be done much faster and the results are better than that of even a few years ago," his report stated. "One of the greatest improvements has been in adapting the equipment to use liquefied petroleum gases as fuel."

For many years acetylene was the only gas available for a metallizing fuel, but in recent years the equipment has been redesigned so that any petroleum gas under pressure can be used. At present, propane is found the cheapest and most convenient fuel.

The amount of oxygen consumed with this gas is said to be somewhat higher than with acetylene but the overall cost of propane is 30% less than that of acetylene. Propane was also said to be easier to control and the metal deposited with this fuel appears to be denser than when other fuels are used, except hydrogen. Hydrogen is being used in a few plants where it is available.

The porous characteristic of the metal deposited by spraying was said by Mr. Young to be an advantage when the deposited metal is intended for erosion or wear resistance. The pores on the finished surface hold tiny drops of lubricant much better than a forged or rolled surface, it was stated. However, when used as a corrosion resistant, the porous characteristics make it necessary to build up a thicker coat to prevent liquids and gases from penetrating to the base metal. Sprayed metal used for wear resistance will generally last longer than the same metal in any other form, it was said.

The following further[2] examples of metallizing applications in refinery machine shop practice and in surfacing parts subject to corrosion conditions were given in this report:

Specific Applications

"When a shaft has a keyway extending into or through the section to be built up make a dummy key so that about 1/32 in. will extend above the finished diameter. Prepare the section in the usual manner, inserting the key just before starting the spraying operation. Machine through the deposited metal and the dummy key until the finished diameter is reached. Drive the key out endwise. Do not attempt to remove it by lifting up on one end.

"Pump rods and plungers that must be built up over the original diameter should have a small bead welded around each end of the metallized section. The bead should be thick enough so it will be machined along with the sprayed metal.

"The preparation of crankshaft journals differs from the usual practice in that the fillets should not be under cut. Local stresses may be set up at these points if this caution is not observed. If the crankshafts are drilled for force feed lubrication, the oil holes should be fitted with rod carbon or chalk. These rods should extend about 1/32 in. above the finished surface. After the journals are ground, the carbon or chalk can be easily removed, leaving the oil holes in the correct size and location through the hard sprayed metal.

"All jobs sprayed in the lathe will have a flash built up on each end. This must be removed carefully before starting the machining operations. Use a round nose tool bit; start at the junction of the flash and the main section; work the tool in towards the shaft and away from the sprayed section. As soon as the base metal is reached, the flash will all come off. The regular machine cut can then be taken without the danger of cracks developing in the flash and being extended into the main section by the action of the tool.

"Castings that have blow holes uncovered in machining can be salvaged where strength is not involved. The area is chipped out to expose the entire cavity. Drill and tap the area on about 1 in. centers for ⅛ in. diameter headless set screws. Sandblast thoroughly and fill with a soft iron wire. Select the length of set screws so they will not extend above the finished surface. In small cavities it may not be necessary to use the set screws.

"Diesels and gas engine pistons have been reclaimed by the metallizing process for several years. No attempt is made to rebuild the ring grooves or the lands. The skirts only are rebuilt. The pistons are first heated to drive out all oil that may have been absorbed in operation. Zinc, iron, bronze and .25 carbon steel have all been used in this application. The choice of metal is based somewhat on the service. Zinc is the leading metal in this application.

"Cavitation in centrifugal pump casings and impellers can be repaired to restore the original efficiency of the unit and prevent further cavitation. The proper metal will depend upon local conditions, being generally stainless steel, bronze or a 13-16 per cent chrome steel. The static and dynamic balance of high speed rotating elements will not be changed if a little

[1] "Metallizing in the Refinery", by J. E. Young, Sr., General Metallizing and Machine Co., Houston, presented before Regional Technical Meeting, Western Petroleum Refiners Assn., Shreveport, Oct. 30, 1942, only recently released for publication.

[2] "Protecting Refinery Equipment by Sprayed Metal Coatings," Technical Section, **National Petroleum News**, March 3 1943, p. R-102, cites oil company experience with metallizing process.

Fig. 2—Gas compressor rod being built up with 12% chrome steel

care is taken to deposit the same amount of metal on each vane. If it is not necessary to fill all the cavities to fully restore the efficiency, the metal can be left as sprayed. If the exact original contour is to be duplicated, the area is filled complete and an allowance is made for grinding. In most cases it is not necessary to do this.

"Iron and steel parts subjected to furnace temperatures and gases generally corrode quickly. Many of these parts are now coated with either aluminum, nickel-chrome steel alloys or straight nickel-chrome wire. Aluminum is the metal largely used for this purpose, although the nickel-chrome wire has recently been used in several large installations. The use of aluminum is recommended where the temperature is below 1800° F. If the temperatures exceed this figure, then we prefer the straight nickel-chrome alloy.

"If aluminum is used, the surface is prepared by blasting and the spraying is done in the regular manner, about .010 inch being deposited. The sprayed surface is then covered with three successive coats of sodium silicate, allowing each coat to dry before applying the next. After the last coat has dried, the work is placed in a furnace where the temperature is about 1500° F. and allowed to remain at this temperature for 30 minutes. It is then removed and allowed to cool in the air. During the heat treatment a thin coat of aluminum oxide is formed on the surface. Under this film will be a thin layer of pure aluminum. Next will come an iron-aluminum alloy, then the base metal. Some oxidation will continue in service, but the diffusion of the aluminum into the base metal will also continue.

"When using the nickel-chrome alloy, the surface is not heat treated but is covered with a ceramic paint directly after the spraying is completed.

"Tanks, floating roofs and other steel structures exposed to extreme corrosion are sandblasted and coated with zinc to prevent critical loss of metal. This application will cost more than a coat of paint, but where the problem is acute it will generally prove less expensive. The sprayed zinc coat leaves an excellent surface for subsequent painting if necessary."

Selection of Metal

Selection of the proper metal in wire form for fusing for the specific application is most important, Mr. Young stated. If corrosion resistance is the main factor, stainless steel, lead or zinc should be used, depending upon the elements causing corrosion. If erosion or wear is the governing factor, a hard steel such as 1.20 carbon or one containing 1% carbon and 2% chromium should be used. If both corrosion and erosion are present, an alloy of 13-16% chromium steel will give satisfactory results. Best results will be obtained where all the factors are recognized in the selection of the metal. Any metal obtainable in wire form can be used in metallizing, it is said.

The portion of the report on metallizing in the refinery which describes the preparation of surfaces for the application of the metal in spray form is summarized in the following paragraphs:

Preparation of Surfaces

Since metallizing does not weld sprayed metal to the base metal, the bond between the two is purely mechanical and preparation of the surface is all important. In preparing shafting and other articles which can be turned in a lathe, rough threading is the best method. The shaft is trued, then a cut is taken across the section to be metallized. Cut should be deep enough to allow for normal wear, usually 0.09375 in. (3/32) on the diameter, and still protect the base metal. A very rough thread then is run on the section, varying from 16 threads/inch for cast iron up to 24 threads for harder base metals. This thread cannot be too rough; the bottom of the groove should be slightly rounded and side well torn to provide many cracks and crevices for the metal to lock around. (A good tool for this purpose may be made by slightly rounding the point of a standard 60° tool and grinding off the top edges so there will be no clearance. Tool should be set about 0.0625 in. below center and slow spindle speeds used.)

In preparing bronze, monel and high nickel alloy steel shafts it has been found advantageous to sandblast lightly after threading, but care should be taken not to cut the thread away. Freshly prepared surface should not be permitted to become contaminated in any way; section should be sprayed as soon as prepared.

Surfaces of articles which cannot be accommodated in a lathe must be sandblasted, using care to select proper grade and size of grit, sand or shot. Fine grains clean rapidly but polish the surface; larger grains clean and leave the rough surface which is desired. Steel grit is the most satisfactory material but cannot be used in some localities because of the high humidity. Reason, it is believed, is because moisture condenses on the grit particles, rusting them in a few hours; when these particles are blasted against steel, tiny rust spots are transferred to the steel ostensibly being cleaned, later causing trouble. In such localities, crushed flint should be used, as it gives nearly as good results. Good blasting, he points out, can be done only when compressed air supply is adequate, clean and dry; pressure should be 100 lbs./sq. in. at the machine. Nozzle is held about 6 in. above the surface to remove mill scale and rust; it should then be held about 15 in. away to produce the desired rough surface.

Spraying Technique

The following spraying technique is recommended:

"After the surface is prepared correctly, the actual spraying operation should be started at once. For material prepared in the lathe, it is best to spray it in place or in a special turning device that will rotate the work at a uniform speed. Mount the metallizing gun in the tool post of the lathe and arrange the gas bottles in a safe, convenient place. The regulators should be within easy reach so any minor gas adjustments can be made as the spraying progresses. Blow out all hose so that no dirt will get into the gun; connect the hose to the regulators and the gun.

"With the gas bottle valves open, slowly screw in the regulators until the pressures reach the proper figures for the metal that is to be sprayed. With the gun valve wide open, make any minor regulator corrections necessary. Close the gun valve and insert the wire in the gun. Light the gun; screw down on the wire feed; screw open the air cap to get the proper atomization; then point the gun at the section to be sprayed. The work should be revolving at about 60 r.p.m. The gun nozzle should be about 5 in. from the surface being coated.

"With the gun opposite one end of the section, spray until it is built up sufficiently to allow for machining operations. Move the gun along about ½ to ¾ in. and repeat until the entire section is sprayed. Unless the thickness of the sprayed metal must be over ¼ in., the preferred practice is to make the entire build-up in one pass of the gun. Where thicker sections must be made, either use two passes or place an air blast on the rear of the shaft opposite the gun to provide the necessary cooling.

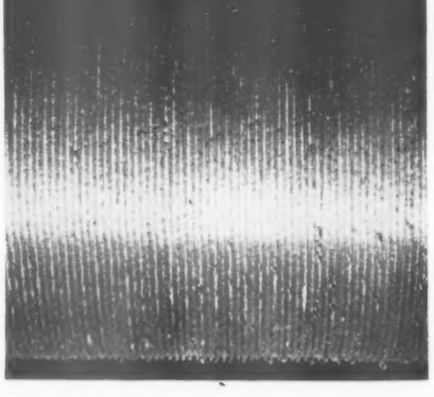


Fig. 1—Close-up of a prepared rod, ready for metallizing

"In spraying it is best to keep the wire feeding through the flame at the maximum rate; that is, see that the flame is melting as much wire as possible. This will prevent the metal getting too hot and will expedite the work. If the lathe is fitted with the proper cross-feed gears, they may be used to move the gun along the section being sprayed. A little experience will soon show what speed is necessary to get the full thickness in one pass.

"When spraying flat surfaces prepared by blasting, the gun is changed from the tool post mounting to the hand grip. The lighting is done in the same manner as described above. Estimate the square feet of the area to be sprayed; weigh out the proper amount of wire for this area and try to deposit it as evenly as possible. The deposit is made in several passes. The first pass is made moving the gun in a horizontal plane over a small area. The next pass is made moving the gun vertically over the same area. This alternation is continued until the correct thickness is obtained, when the next section is started. Always keep the gun pointing at the surface at right angles; otherwise, the spraying efficiency will be lowered due to some of the particles failing to stick."

"In spraying the inside of refinery vessel that contains angles or other structural members, examine carefully to see that there is no open space between them and the shell. If there is such a space, it should be welded so the sprayed coat can be continuous, preventing gases and liquids from getting to the uncoated metal."

A number of operating helps were given:

"Lead, tin cadmium and babbit should be wire-brushed thoroughly between each pass to remove most of the oxide that forms when spraying these metals. Denser deposits will result. If any grinding is done on sprayed metal on the inside of vessels, great care should be taken to see that the coat is not ground away in some spots."

Safety Precautions

Precautions in metallizing work necessary for the safety of operators were given as follows in the report:

"All low-melting-point metals are toxic in some degree when hot. Approved type respirators and masks should be worn when spraying these metals. Goggles should be worn when spraying other metals to prevent small particles from entering the eye. Workmen wearing corrective lenses should wear goggles over these lenses, since the flying particles of molten metal striking the polished surfaces of the lenses will stick and destroy them.

"When spraying inside buildings where other workmen or spectators can congregrate, arrange screens or other guards so no one can get in front of the gun while it is in operation. The spray should never be directed toward the oxygen or fuel tanks, the hoses or other workmen. Proper care and lubrication of the equipment will prevent backfires in the gun itself. When more than one fuel is commonly used, the operator should be cautioned that it is necessary to change the wire nozzle to suit the fuel being used. One style nozzle will burn only acetylene while the other will burn all other fuels except acetylene."

YOU HAVE AN OBLIGATION ON THE HOME FRONT, TOO...
"MONTY"
(Montmorillonite Structure)
To Last for the Duration, Cars Need BIGGER RATIONS OF BETTER LUBE

The need for quality lubricants was never as great as it is today—cars now on the road *just must last*—jallopies, or sleek streamliners, they can't be replaced. And they need the best lubrication care to help stretch rationed gas and to minimize repairs.

Modern refining methods that will produce maximum capacity of high quality specification lube oils are needed to meet this urgent obligation. Filtrol engineers, with their highly activated agent, "Monty," will help you. The engineers will survey your plant, study your processing technique and make recommendations that should result in a marked increase in both the quality and the quantity of your lubricating oils. Super Filtrol will help attain these desired results too—it will produce better oil, and more of it, at lower cost, and with less equipment. Quality is the significant thing today—and we can help you attain it. Filtrol Corporation, 634 S. Spring St., Los Angeles, California. Plants: Vernon, California and Jackson, Mississippi.

Super **FILTROL**

THE ACTIVATED AGENT SPEEDS PRODUCTION—CONSERVES MATERIALS

Scientific, Technical, Inventive Industrial Mobilization for War*

By Gustav Egloff**

The enactment into law of the proposals now before Congress to mobilize under government direction the technological manpower of the nation would be devastating upon our war effort and our later peacetime progress, a prominent scientist of the oil industry and head of a national association of chemists believes.

Proposals of this nature are contained in Senate Bill 702, which calls for continuing legislation to mobilize the scientific and technical resources of the nation, in peacetime to come as well as for the duration of the war; they are also a part of the provisions of Senate Bill 607, a measure to centralize all parts of the war effort in an Office of War Mobilization. Following is an analysis of the specific provisions of Bill 702 and general comment upon the effect of both bills on research and inventive progress in our nation, as presented by this authority before meetings of chemists in Washington and Chicago.

THE scientific technological and production men of the U. S. are doing the greatest job ever undertaken in the history of mankind—namely, converting this great country from a prosperous, peacetime economy to an all-out war effort. This job, or rather the many jobs, are being done, with the closest cooperation between government and industry that this country has ever seen, in spite of the many slips, halts and errors that occur.

In 1942 we produced 48,000 airplanes as against about 1000 a year before the war; 45,000 tanks as against none before the war; ships at the rate of 2 or 3 a day; high explosives at a rate of over 20 times that of World War I; and tremendous quantities of myriad other products which go to war. These facts speak for themselves.

In this amazing development, we have outstripped Germany not only in production but also in research in which the Germans were long thought to lead the world. Before the last war, it was generally considered that a man seeking a sound and comprehensive scientific education had to go to Germany; American universities were thought inadequate. That day is long since past. From time to time, our attention has been directed toward the so-called super-coordination of science, technology, and industry in Germany, as if it were a shining beacon toward which the U. S. A. should direct its footsteps. This very coordination in Germany, where science, technology, and industry have been regimented, will prove that nation's undoing.

By enforcing regimentation, Germany has frozen her scientific and technical work. As a result, she will lose the war, because there is lacking the mainspring of competition between different companies and individuals, which motivates progress in a land of private initiative and private enterprise.

Achievements Possible Only Here

The amazing results we have obtained in the short space of two years would have been impossible in any other country. The inventiveness, ingenuity, and resourcefulness of American scientists, technologists, and industrial management have been given free play to develop to their fullest stature. When the emergency arose, outstanding leaders in research and industry were called into governmental service. Despite limited supplies of almost all critical materials, clashing of personalities, and the urgency for tremendous speed, these research and development organizations are now proceeding smoothly with their work. Results are becoming increasingly valuable.

It would seem to be a great mistake to disrupt the research, development, and production organizations that have been built up with so much trial and error, but disorganization would certainly follow any attempt to regiment our whole national economy under such an arrangement as that provided in the KILGORE BILLS which are now before the Senate. Although the bills have the apparently sound objective of concentrating scientific and technical effort under a single director, the real effect of passing them would be disastrous to the war effort and the peace to come.

It is not too much to say that their passage might well be worth a hundred divisions to our enemies.

The nation has had peace as a basis of its economy for a number of years; consequently the conversion to an all-out war program has shifted the national economy from a 6.7-billion dollar-a-year expenditure for military purposes to 97 billions. The task of mobilizing and equipping an army of 11,000,000 men and furnishing the material for the United Nations has called for full mobilization of the civilian manpower, national economy, and individual resources.

Several years ago a number of governmental agencies were set up for the handling of the vast organization, production, and distribution of commodities, techniques, and personnel which are necessary under prevailing conditions. Naturally this drastic change-over has not been accomplished without some friction and growing pains. Bottlenecks developed in many places, but when the enormous size of the task and actual results being obtained on the production line are considered, the output of our plants is staggering.

Senate Bill 702 introduced Feb. 11 and referred to the Committee on Military Affairs, provides for the placement of all scientific and technical problems, personnel and functions under the direction of a new governmental bureau. The bill provides for "mobilizing the scientific and technical resources of the Nation, establishing an Office of Scientific and Technical Mobilization, and for other purposes".

Purpose of Office Described

The general purpose is described as follows:

> "To appraise the current use of scientific and technical knowledge, facilities, and personnel, and to develop comprehensive national programs for the maximum use of science and technology in periods of peace and war.
>
> "To mobilize, for the prosecution of war all scientific and technical facilities and personnel."

Comment: The above apparently is intended to establish the office as a permanent one for both war and peace.

The definitions of scientific and technical facilities and personnel as given in Sect. 2, indicate the wide scope of this proposed legislation. These definitions read:

"(a) 'Scientific and technical facilities' shall include real property and personal property, tangible and intangible, used or intended to be used for scientific or technical purposes, programs, research, projects, and developments and shall include further all methods, processes, procedure, techniques, designs, specifications, patents, inventions, and scientific or technical information or knowledge of every description used or intended to be used for scientific or technical purposes in research and

*Presented before Washington, D. C. Chapter, American Institute of Chemists, March 13, 1943.

**Director of Research, Universal Oil Products Co.; president of the American Institute of Chemists.

development or in the production or supply of war or civilian goods or services.

"(b) 'Scientific and technical personnel' shall include all persons, excepting physicians and dentists, who have completed any course of study in any college or university in any branch of science or its practical application or who have had not less than an aggregate of six months' training or employment in any scientific or technical vocation."

Sect. 3 provides for an administrator for the Office of Scientific and Technical Mobilization, appointed by the President, to receive a salary of $12,000 a year. His assistants are to be under Civil Service, but it is provided the Administrator may waive this requirement when deemed necessary.

Office's Powers Listed

The powers of the office are set forth as follows in Sect. 4:

"(a) To take and keep a census of scientific and technical facilities, requirements, and personnel in the United States and its possessions and to provide archives for all scientific and technical material coming into the possession of the Government or any agency or department thereof.

"(b) To formulate and promote projects and programs for the development and use of scientific and technical facilities and personnel and, when necessary, to initiate and carry out such projects.

"(c) To foster and develop scientific and technical methods, to promote their application in the national welfare, either within the Office or by other auspices, public or private, and to promote and provide training and participation in science and in its application.

"(d) To ascertain and assess scientific and technical developments in relation to, and to study their impact upon, the national welfare, or any particular category thereof.

"(e) To solicit and to receive aid and support from any source for the advancement of scientific and technical methods.

"(f) To coordinate the scientific and technical data, methods, and facilities of, or available to, all agencies and departments of the Federal Government.

"(g) To foster international cooperation in scientific discovery and the application thereof; to acquire information with respect thereto from other countries and their nationals; to exchange scientific and technical personnel and information with such countries; and to engage in other suitable forms of international collaboration relating to science and technology.

"(h) To make available, upon request, to the President, to the Congress, and to other persons or establishments (upon such conditions as the Administrator shall prescribe), technical guidance and assistance and any record or other data necessary therefor.

"(i) To review specifications, standards, and designs of military and civilian products and services and their methods of production and supply and to recommend suitable simplifications and charges therein.

"(j) To finance by loan, grant, exchange, purchase, or otherwise the operations or functions, or any of them, authorized by this Act, and, for the same purposes, to make or acquire any contract, guaranty, indemnity, stipulation, lease, or other instrument, to acquire, improve, and alter real and personal property, and to enter into any other transaction necessary or appropriate for the performance of its duties or powers.

"(k) To acquire patents and patent rights, and to authorize the use thereof, subject to the provisions of Section 7 of this Act, and to authorize the use or other disposition of any other property belonging to, or controlled by, the Office, upon such terms and conditions and for such compensation as the Administrator shall determine, which compensation shall be payable to the Office.

"(l) To establish a system of merit awards to be granted to any agency, establishment, or person making any outstanding scientific or technical contribution to the national defense or the general welfare.

"(m) To make, amend, and rescind appropriate rules and regulations to carry out the purposes of this Act and all the powers and duties vested in the Office, which rules and regulations shall have the force and effect of law.

"(n) To avail the Office of the information, services, facilities, officers, and employees of any Federal establishment in carrying out the purposes and provisions of this Act.

"(o) To conduct such research and investigation touching upon the use and development of scientific and technical facilities and personnel as the Office may deem necessary and appropriate to carry out the purposes of this Act."

Sect. 5. Mobilization of Personnel, provides that the Selective Service Act may be amended to give the Administrator of the Office of Scientific and Technical Mobilization power, when he deems it necessary, to obtain occupational deferments for technical men. This section further provides:

"(b) During the existence of a state of war and for six months thereafter, the Administrator is authorized to prescribe and promulgate appropriate rules, regulations, procedures and methods, subject to direction by the Chairman of the War Manpower Commission, for the training, classification, and employment of all scientific and technical personnel by any person, agency, or establishment, public or private."

Could 'Draft' Technical Men?

Comment: This paragraph apparently grants the Administrator the power to draft any technical man for service at any place he may designate.

In Sect. 6, Mobilization of Facilities, if he decides the need is urgent the Administrator is authorized to requisition the use of any scientific or technical facility, any license, easement, privilege or right therein, if such facility cannot be otherwise obtained on fair and reasonable terms. Administrator's power does not extend to any patent itself but is "confined to licenses or any other right therein respecting user, together with the right to grant sub-licenses."

During war, the Administrator may conduct investigations of technical facilities for war or civilian supply in order to evaluate efficiency of such production.

Priorities for critical material and equipment technical research and development will be cleared through the Administrator.

Drastic changes in our patent system would result from the provisions of Sect. 7, "Production (probably Protection is meant) of the Public Interest in Discoveries and Developments Financed by the U. S." Par. (a) of the bill reads:

"(a) Any provision of law to the contrary notwithstanding, the Office is hereby vested with the exclusive right to use, and with the exclusive right to license others to use, (1) any invention, discovery, patent, or patent right which has heretofore resulted, or shall hereafter result, from research or invention for the carrying on of which the United States or any department, agency, or establishment thereof either has heretofore contributed at any time since the declaration of national emergency on May 27, 1941, or shall hereafter contribute, any money, credit, physical facilities, or personnel; and (2) any invention, discovery, patent, or patent right which is at the time of the enactment of this Act, or shall hereafter become, to any extent the property of the United States or of any department, agency, or establishment thereof."

Section on Compensation Quoted

Par. (d) of Sect. 7, pertaining to compensation to the owner of patent, reads:

"(d) Any owner or assignee of, or any person having an interest in, any invention, discovery, patent, or patent right which has been vested in the Office by virtue of the provisions of subsection (a) of this section shall be paid fair and just compensation for any deprivation of property right resulting from such vesting, to be determined in the same manner as provided in Public Law Numbered 274, Seventy-seventh Congress, as amended, except that the Administrator, subject to review by the President, shall make all determinations in the first instance respecting fair and just compensation: *Provided*, That the Office is also authorized to make suitable compensation, as determined by the Administrator with the approval of the Board, to individual inventors or discoverers or to individuals contributing to inventions or discoveries including employees of the Federal Government, as a reward for their inventions or discoveries or for their contributions thereto when such inventions or discoveries are deemed by the Administrator to be in the national interest and when they are vested in the Office by the provisions of subsection (a) above."

Comment: Par. (a) above, apparently grants the Office the power for the exclusive use and

right to license under any patent covering apparatus or process with which the government has been associated since May 27, 1941. It would appear that if the government has contributed, *even to the smallest extent*, any one of the following items: "any money, credit, physical facilities or personnel," then such contribution gives the government the exclusive right to use and right to license others to use said apparatus or process.

Paragraph (d) of this section appears to provide that the Administrator may decide what will be fair compensation to the owner of a patent covering apparatus or process which may come under government control. Payment of this compensation to individual inventors, however, appears to be contingent upon authority being granted the Office to compensate the individual inventors who are the patentees of patents vested in the Office.

The sum of $200,000,000 is to be appropriated upon the passage of the bill and other sums as necessary.

The Administrator may organize corporations to carry out provisions of this act and make loans to these corporations or purchase the capital stock.

Senate Bill 702 seems to have been written with no knowledge of existing governmental bureaus which have mobilized and are still mobilizing scientific and technical manpower and the laboratories and equipment in the U. S.

At the present time there are six agencies that constitute the scientific high command in the national government. Through their direction practically all of the universities and colleges are working on war problems. Industry shows that about 95% of their scientific and technical personnel and equipment are directly engaged in researches having to do with the war, both of their own and those suggested by the National Defense Research Committee. Like the mobilization of the Army, Navy and Air Force, the scientific and technological mobilization has not been perfect. Yet the achievements of science and technology have been great. The N.D.R.C., the Office of Scientific Research and Development of the War Production Board, and other governmental agencies all tie in closely with the Army and Navy. All the scientific and technical brain power are working intensively on problems connected with total war.

Would Disrupt Present Systems

All scientists, technologists, engineers, and all facilities available in the form of laboratory equipment, pilot plant, semi-commercial units are to be commandeered with the sum total of knowledge. The past results, present problems, and the future problems together with the direction of future developments, are already in the service of the government. Disruption of the fine organizations and highly sensitized organizational plans that are already functioning very well under the able leadership of our best brains having at their command the combined technical knowledge of the nation would occur with the passage of Senate Bill 702. These research groups so finely organized to bring the magnificent inventions to fruition may seem a far cry from the production flowing from an assembly line, but they are just as highly necessary.

Should this bill pass, there would be a totalitarianism unrivalled by our foes. In a democratic state which has been made as magnificent as it is, based upon the free play of initiative, inventiveness, and competition, the passage of this bill would obliterate all the initiative that is present in our way of life. This bill would give the power to break contracts such as those of the National Defense Research Committee or the Office of Scientific Research and Development.

This bill would provide for taking over ownership of any inventions which may be involved, in both new contracts and all those that are already in force. All that the bill provides is that it would be necessary only to "contribute", to the project, for one could argue from the bill that if the government just made a loan or placed a single man on the job that it would be a contribution and hence it would have the right to seize all inventions involved. The confiscatory powers may also go to taking over all patents that may be involved in order to facilitate the transaction from the war effort to peacetime enterprise.

No Provision for Cessation

This bill goes over into the peace period, with no provisions for the cessation of the activities as an "Office of Scientific and Technical Mobilization, and For Other Purposes". This may well mean that not only during the present war but in the peace to come all researches, facilities and developments would be in the hands of the government, who would supply anyone with full information through this office. The inventions which are turning the tide of war today would have been impossible without the patent system, the heart of which is aimed at in Senate Bill 702. These provisions of Senate Bill 702 are a carry over from Senate Bills 2303 and 2491 of the 77th Congress. The patent system in this country has endured over 150 years and has promoted the greatest scientific, technical, and commercial development of any nation in history. Without the amazing industrial processes and developments that have been fostered by our patent system, it is doubtful if the United Nations could win this war.

Most of these processes are not "war babies". Some of them have been operated successfully to make peacetime products. Others on which research had long been progressing were rapidly brought to commercial status under the spur of war. One receives the impression from published statements that our patent system is an unmitigated evil, when in reality it has made the U. S. the leading industrial figure in the world. An amazing production together with a transportation capacity by land, sea, and air is supplying the United Nations with materials of every character in ever increasing quantities.

Without the protection offered by the patent system, few new developments could be expected, for initiative and inventiveness would have no incentive. Many large and small companies maintain research staffs and continually carry on investigations for the improvement of processes and the discovery of new products. A general belief is that only the large corporations own or control the most patents, but this is far from the truth. According to Patent Commissioner Coe, during the Hearings before the Temporary National Economics Committee, 83% of the patents issued went to small companies and individuals, and 17% to the large corporations.

Cites TNEC Record

The following table covers the detailed data:

Patents Issued 1938[1]	Average Percent
Large corporations	17.2
Small corporations	34.5
Foreign corporations	5.4
Individuals	42.9

1. T.N.E.C. Verbatim Record of Proceeding Vol. 1. p. 416-417 December 1, 1938 to January 20, 1939.

(The speaker concluded his remarks by describing the part that new inventions have played in the development of the oil industry, which he described as one of the most progressive industries in the world, reaching its greatest development in the U. S. "Its tremendous role in the present war depends squarely upon the American Patent System," said Dr. Egloff. His conclusions as to what the patent system has done for the oil industry are as follows:)

1—It has been a tremendously stimulating force for the conservation of crude oil.

2—It has developed new fuels of far greater power output for use in motor cars and airplanes.

3—Our whole civil and industrial life depends on the thousands of products which stem from the inventions made in the oil industry.

4—Toluene from oil is a major contribution to the war effort.

5—The synthetic rubber program is based largely on processes patented by the American oil industry.

6—It has given employment to over 3,000,000 people who have been required to develop through research and operation the numerous projects brought to successful commercialization.

7—The oil industry based upon processes and inventions is highly competitive. As inventions are made and patents appear, they stimulate other scientists and technologists in industry to bring forth new or competing processes, and new and better products.

8—The patent system is encouraging increasing continuance of research and investigation of all kinds, which results in better products for everybody.

9—There can be no doubt that if the patent system is drastically changed or abolished, our world industrial leadership will fall.

Technical Section, NATIONAL PETROLEUM NEWS

Published Every Month by

The National Petroleum Publishing Company

Publication Office, 1213 West Third Street, Cleveland, Ohio, U. S. A.

V. B. Guthrie, Editor, Technical Section • D. P. Thornton, Jr., Assistant Editor

Contents

APRIL 7, 1943

Inventive Minds Can't Function in a Strait-Jacket (Editorial) ... R-147

Practical Methods for Improving Plant Cooling Water Systems ... R-148

Chemical Descaling of Refinery Heat Exchange Equipment ... R-152

Water-Cooled Tube Supports for Oil Tubes in Heaters ... R-155

Codimer for Aviation Gasoline Produced in Revamped Catalytic "Poly" Plant ... R-156

Expeditors of Equipment for Petroleum War Plants ... R-158

Workers Trained in Refinery Crafts While in Full-Time Plant Jobs ... R-159

ABC of Chemical Derivatives from Petroleum: Article 5, Detergents and Lubricants, By R. L. Wakeman and B. H. Weil ... R-161

Photo Story of Two War Rubber Plants ... R-168 & R-169

Re-Refining Aircraft Lubricating Oil, By Gilbert K. Brower ... R-172

Catalytic Vapor-Phase Alkylation of Benzene With Ethylene, By W. A. Pardee and B. F. Dodge ... R-180

Technique of Metallizing to Protect Equipment from Wear and Corrosion ... R-185

Scientific, Technical, Inventive and Industrial Mobilization for War, By Gustav Egloff ... R-188

NOTE—The decimal numbers which appear in the margin opposite the headings of articles throughout the Technical Section are for the benefit of readers who use the Uren Decimal Index System in filing and indexing articles.

INDEX TO ADVERTISERS

Technical Section

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

American Meter Co. ... R-151
Badger & Sons Co., E. B. ...
Blackmer Pump Co. ...
Brooks Equipment & Mfg. Co. ... R-171
Clark Bros. Co., Inc. ...
Emery Industries, Inc. ...
Erie Bolt & Nut Co. ... R-179
Filtrol Corp. ... R-187
Johns-Manville Corp. ... R-165
Kellogg Co., M. W. ...
Kimble Glass Co. ...
Lummus Co. ... Insert
Monsanto Chemical Co. ...
Pennsylvania Salt Mfg. Co. ...
Petroleum Rectifying Co. of Calif. ...
Phillips Petroleum Co. ...
Platt's War-Oil Communication Services ... R-191
Sun Shipbuilding & Dry Dock Co. ...
Taylor Instrument Companies ...
Universal Oil Products ... R-173
Warren Petroleum Co. ... R-157
Wyatt Metal & Boiler Works ... Outside Back Cover

Refinery Supts.

NEW EDITION OF

PLATT'S

OIL PRICE HANDBOOK

Now Ready

—contains complete record all 1942 petroleum prices

When you want to know what a particular price was on a certain specific date you usually want this information in a hurry. There is no surer way to get it quickly and accurately than by consulting Platt's Oil Price Handbook. This year's edition contains—

FEATURES OF THE 1942 EDITION

- Refinery and Seaboard Daily Prices
- Averages of "Highs", "Lows", Combined "Highs" and "Lows"
- Tank Wagon and Dealer Prices of Gasoline
- Tank Wagon Prices of Kerosine and Naphtha
- Fuel Oil tank wagon prices
- Aviation Gasoline tank wagon prices
- Statistics and Graphs
- Oil River Terminals, Cycling Plants
- Specifications for U. S. Govt. Motor Fuels
- Refinery Directory

Print order for this 1942 edition is strictly limited by war-time restrictions. Since this is a book that every refinery superintendent needs to consult frequently, we suggest that you send in the coupon today. Then you will be sure of having a copy handy when you want it most.

$12.50 per Copy

4743

NATIONAL PETROLEUM NEWS
1213 W. Third St., Cleveland, O.

Attached is my check covering ... copies of Platt's Oil Price Handbook for 1941 at $12.50 per copy.
(Ohio purchasers please add 3% tax to each order)

Name ...

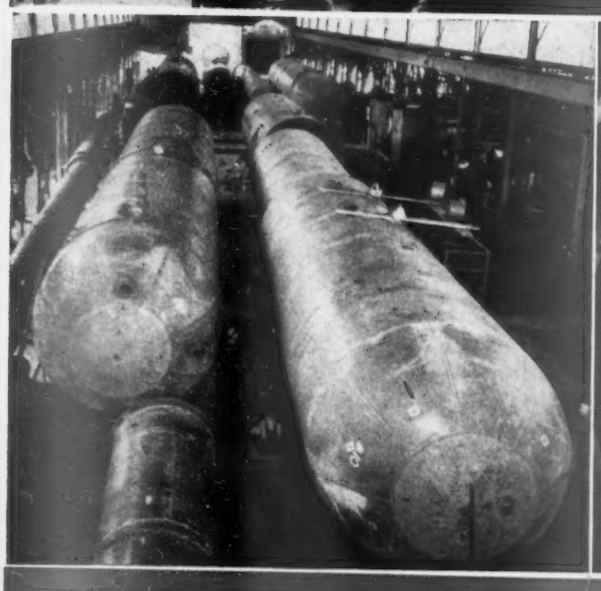
Company ...

Address ...

City ... State ...

Platt's
WAR-OIL COMMUNICATION SERVICES

NEVER BEFORE HAVE WE BEEN PRIVILEGED TO PRODUCE SO MUCH SO SOON!

More than a thousand men are busy in Wyatt plants . . . very busy. Never, today, is the hum of production hushed at any point around the clock. Every man is doing his specific job well, thanks to valuable experience, for many of them have spent their working lives here. Every man is doing his job willingly . . . and happily . . . for never in history has there been greater cause for loyal effort. As a result, finished fabricated steel products are rolling out of our plants as never before . . . rolling into action for America's vital industries.

wyatt's